VOL. XXII. Nº 4. APRIL 1937

MECCANO MAGAZINE



THE ATLANTIC FERRY

(see page 190)

6D.

★ IMPORTANT ANNOUNCEMENT...

"Princess Elizabeth"

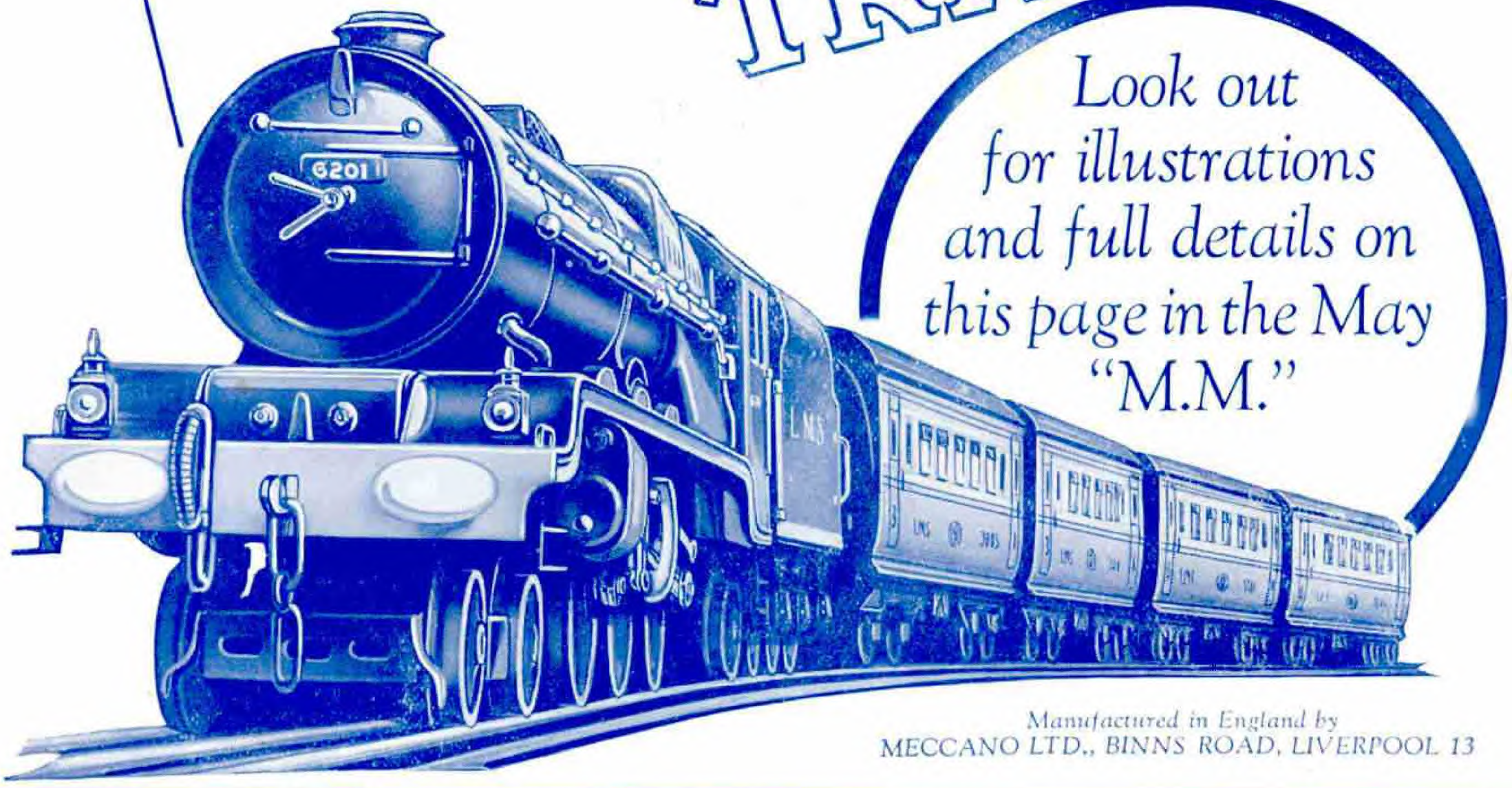
A MAGNIFICENT HORNBY SCALE MODEL OF THIS WORLD RECORD-BREAKING LOCOMOTIVE APPEARS NEXT MONTH

On 1st May we introduce a wonderful scale model of the L.M.S.R. locomotive "Princess Elizabeth." This magnificent L.M.S.R. locomotive made railway history in November 1936, when she hauled a train from Glasgow to London at an average speed of 70 miles per hour, thus setting up a world record for long-distance non-stop steam travel.

This notable introduction forms another outstanding landmark in the development of the Hornby Railway System. By reason of its faithfulness to the original it will make an instant appeal to all who see it.

Fitted with 20-volt auto-reversing motor

HORNBY TRAINS



Look out for illustrations and full details on this page in the May "M.M."

Manufactured in England by
MECCANO LTD., BINNS ROAD, LIVERPOOL 13

EXTRA SPECIAL EDITION

"HAWK" MONOPLANE FLIES 600 ft.

Hamley's News
· HAMLEY · BROTHERS · LTD · ESTABLISHED · 1760 ·
200-202, REGENT ST., LONDON, W.I. OUR ONLY ADDRESS
Telephone: REGENT 3161

No. 19 April, 1937

GREAT NEW POCKET CAMERA

MODEL PLANE MAKES 2-MILE FLIGHT

New launching gear makes long flights possible!

A new streamlined Pocket Camera

THE VOGUE CAMERA, size 4⅞ inches by 2⅞ inches, opens and extends automatically. Instantaneous or "bulb" exposure. Brilliant direct view finder–F/10 Meniscus lens. Pictures about 2 inches by 1¼ inches. 6-Exposure Films, 9d.



PRICE **12′6** Post 4d.

Wonderful Camera Outfit

SIDA CAMERA PRESENTATION OUTFIT, camera case and film. Direct brilliant lens view finder, time and instantaneous shutter. Bush for tripod, extra 10-exposure films, price 1′-.

PRICE Complete **7′-** Post 6d.

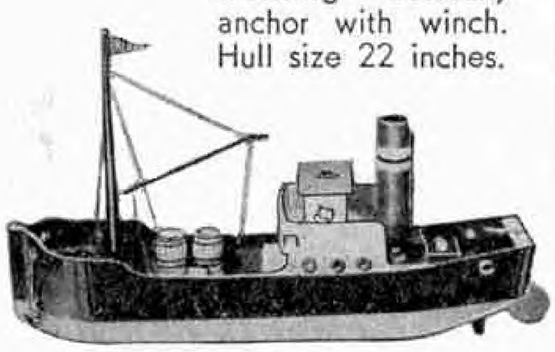




THE "CONDOR" LONG DURATION SAILPLANE has been especially designed by experts to give an inordinately long flying time. With a wing span of 44 inches, this wonderful glider will soar a distance of at least two miles, according–of course–to weather conditions. Coloured in red and white, with a double surface main plane, the "Condor" is propelled by an amazingly powerful launching gear. Foreign. PRICE **21′-**

CLOCKWORK CARGO BOAT

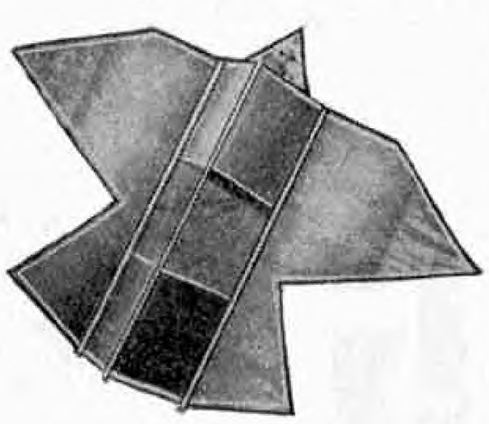
Fitted with a powerful clockwork motor, this model Cargo Boat is an exact miniature replica of the real thing. The hold contains the cargo, working derrick, anchor with winch. Hull size 22 inches.



Other Models **7/6, 10/6** and **29/6**

PRICE **17′6** Post 9d.

Kite looks like bird



The "Parrot" Kite is, as far as flying is concerned, simplicity itself. Huge heights can be attained, and–from the ground–the kite has the appearance of a bird in flight.

PRICES –
26 ins. x 26 ins. **2′6.** Cord and winder **1′-.**
26 ins. x 36 ins. **4′6.** Cord and winder **1′9.**
42 ins. x 50 ins. **6′6.** Cord and winder **2′9.**
46 ins. x 60 ins. **8′6.** Cord and winder **4′6.**

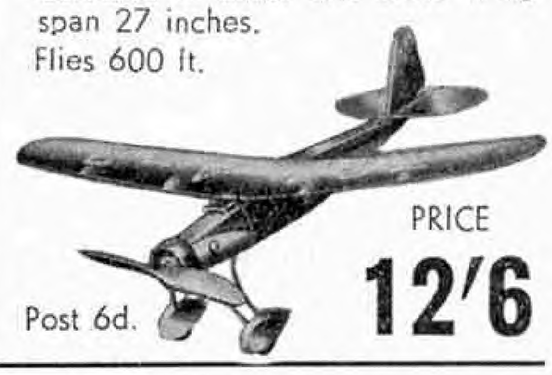
THREE HIGH-SPEED MONOPLANES



PRICE **7′6** Post 6d.

"HAWK" SINGLE SEATER MONOPLANE. This wonderful crash-proof machine will fly 600 ft. off the ground. Constructed of wire and canvas, hand carved propeller. Wing span 24 inches. Foreign.

"MERCURY" AIR LINER. A new model monoplane with tubular fuselage, 9-cylinder dummy engine. Coloured in silver and blue. Wing span 27 inches. Flies 600 ft.



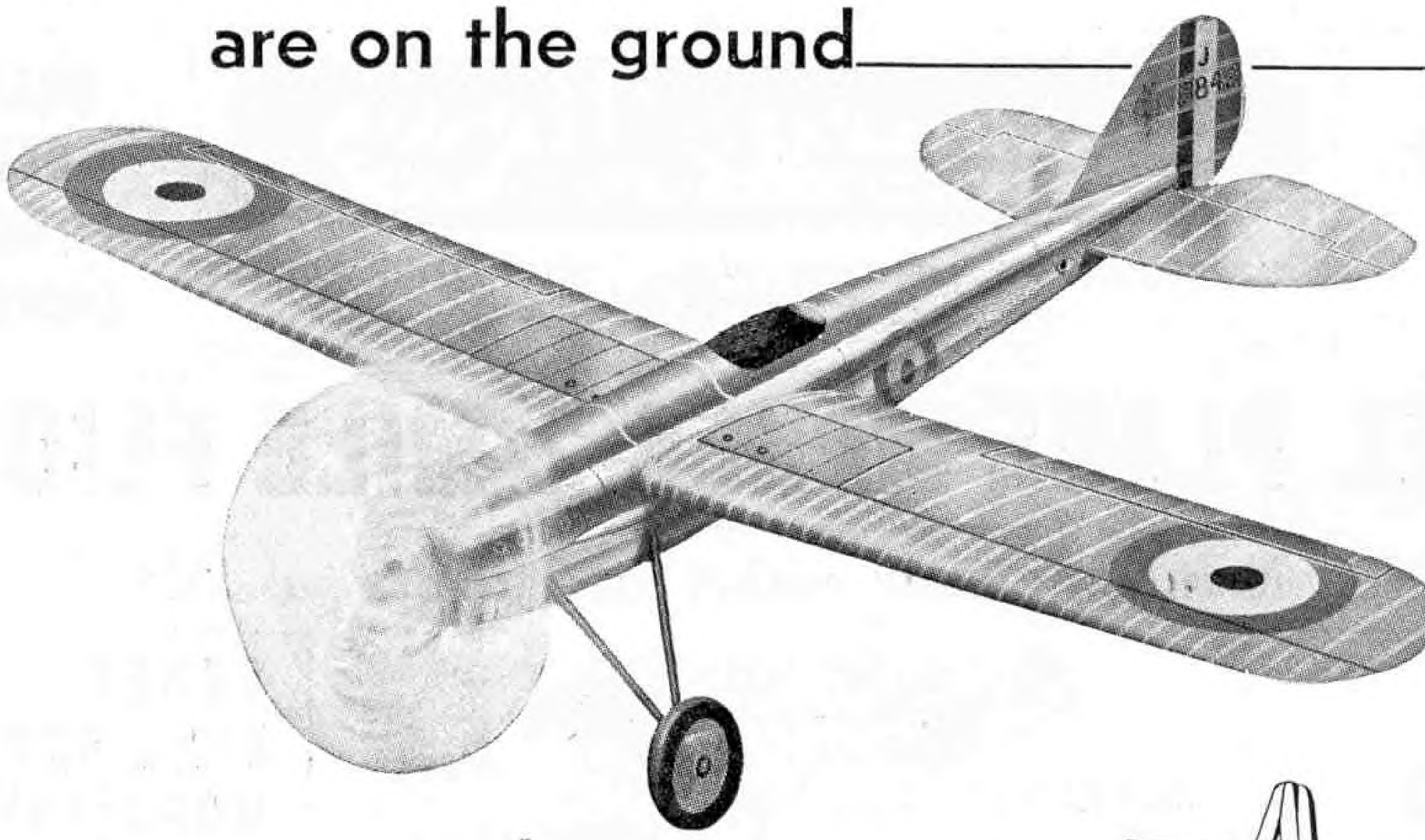
PRICE **12′6** Post 6d.

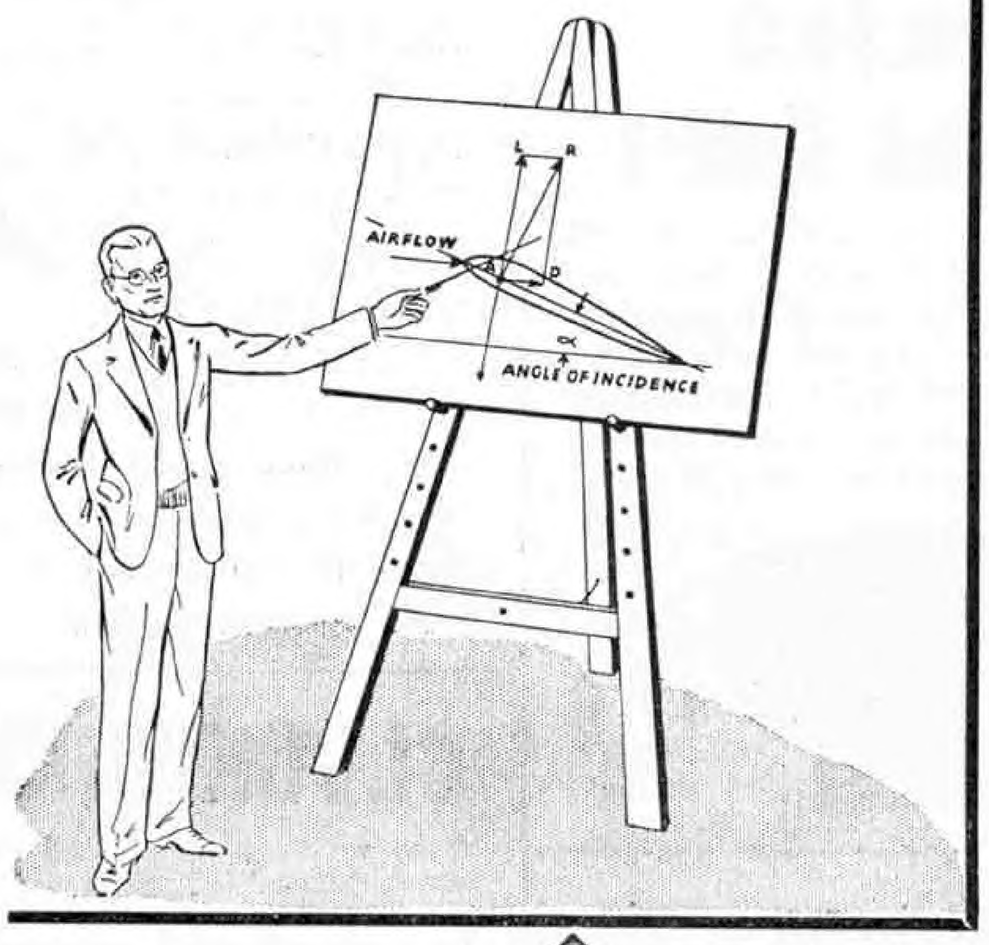
F.R.O.G. HIGH PERFORMANCE COMPETITION AEROPLANE. Wing span 38 inches. Weight 4 ozs., fitted with "free wheeling" device. Average flight of 2 minutes and rises off the ground. Constructed of balsa wood and covered with jap tissue.



PRICE **49′6**

A pilot's first lessons are on the ground





In flying, as with every other study, knowledge of the theory simplifies the learning of the practical side. The FROG MK. IV Interceptor Fighter is ideally suited for the purpose of instruction as it is technically accurate and responds to the adjustments of the controls exactly as does a real R.A.F. plane.

All-metal Fuselage of Tubular Construction, Patent Detachable Undercarriage and Hollow Wings, Powerful Motor, coupled to a Precision-cut Gearbox, accurately carved Airscrew. Complete with PATENT HIGH-SPEED WINDER BOX, Motor Lubricant, Gearbox Oil, two spare Motors and Inserter Rod, and fully illustrated Flying Manual. Wing Span 11½". With practice will fly 300 ft.

PRICE ONLY 5/- EACH

OBTAINABLE FROM ALL GOOD TOYSHOPS AND STORES

FROG

TRADE MARK REGD.

SCALE MODEL AIRCRAFT

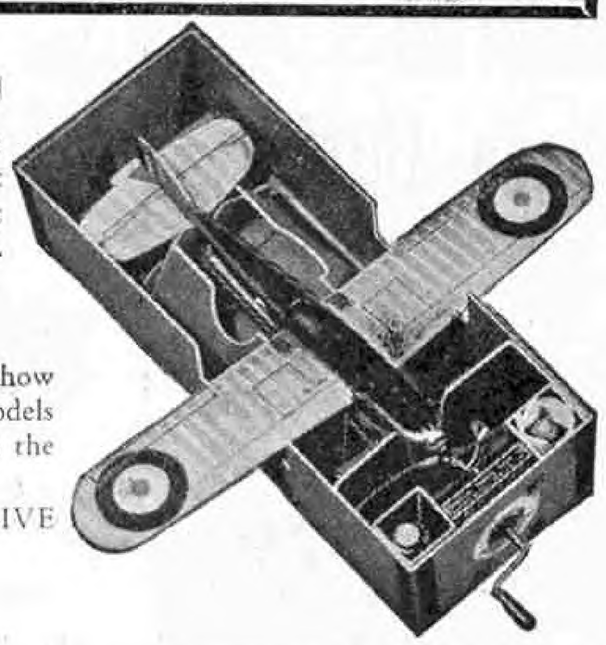
All FROG model aircraft are covered by world Patents granted and pending. Made in England by International Model Aircraft Ltd.

Sole Concessionaires:

LINES BROS. LTD., Triang Works Morden Road, Merton, London, S.W.19

FREE FLIGHT INSTRUCTION

Lines Bros. will give free flight instruction by appointment on the Frog Aerodrome at Merton. phone: Liberty 1041.



This illustration shows how quickly the Frog scale models are wound up for flight with the geared-up winder box.
A PATENT AND EXCLUSIVE "FROG" FEATURE.

COUPON To Lines Bros. Ltd. (Dept. 5), Morden Road, London, S.W.19

Please send me your "Frog" coloured leaflet with particulars of the "Frog" Flying Club and how to obtain handsome enamelled Air Force Pilot badges.

Name.....

Address.....

.....

Please write in block letters. 4/37

IN ONE SECOND

your pistons

make

266* strokes!

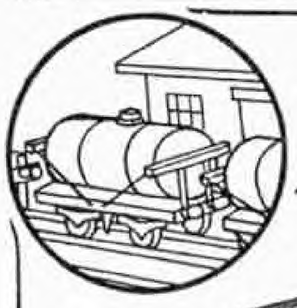
AT ONLY 30 M.P.H. IN TOP GEAR

You need a dependable lubricant if you are to prevent metal rasping against metal at the rate of 266 strokes a second! Patent Castrol is more than just a dependable lubricant—it is an economical one. The patent tin and chromium content reduces cylinder wear which, in turn, effects great savings in oil consumption.

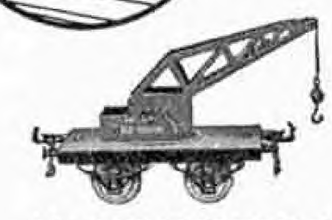
WAKEFIELD PATENT Castrol MOTOR OIL

★ *The engines of the most popular cars (8-10 h.p.) make 4,000 revolutions per mile which equals 8,000 strokes per piston or 32,000 strokes by four pistons. Thus the pistons make 960,000 strokes per hour at 30 m.p.h., or 266 strokes per second.*

C. C. WAKEFIELD & CO. LTD., *All-British Firm*, Wakefield House, Cheapside, London, E.C.2



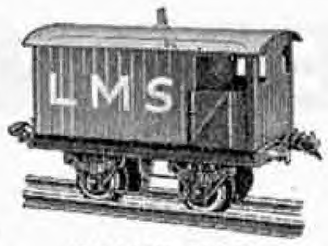
HORNBY ROLLING STOCK



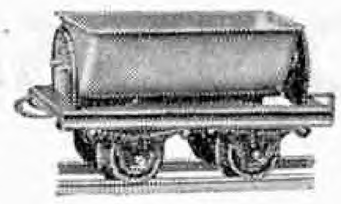
No. 1 CRANE TRUCK
The Crane revolves on its base. Price **2/11**



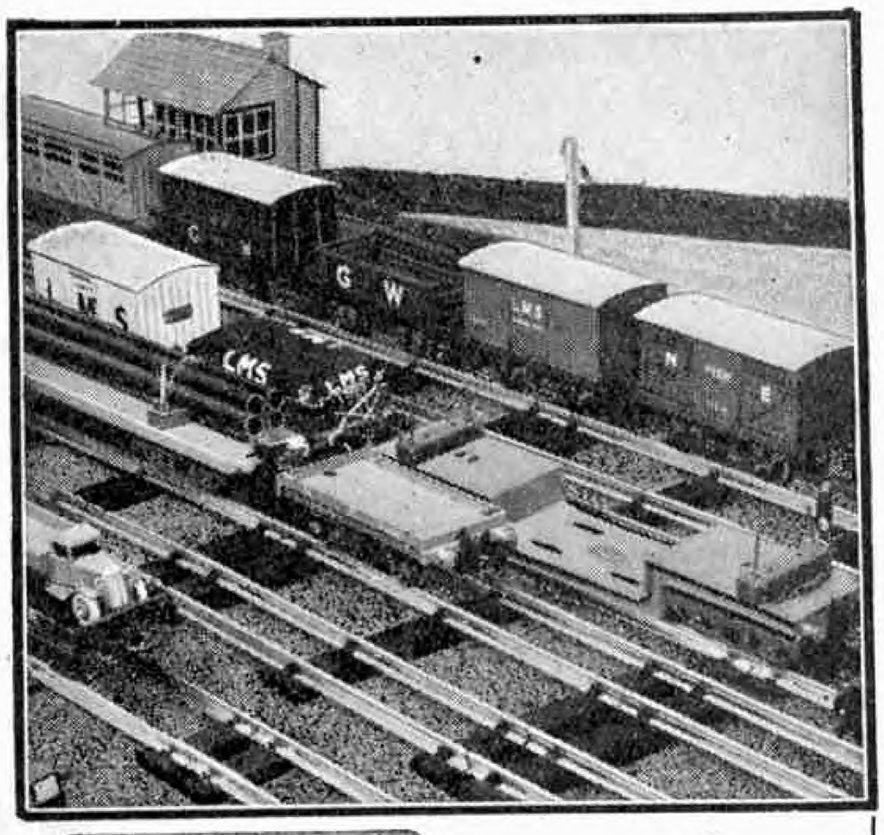
No. O ROTARY TIPPING WAGON
Price **1/6**



BRAKE VAN
Opening doors, in L.M.S. or G.W. lettering. Price **2/11**

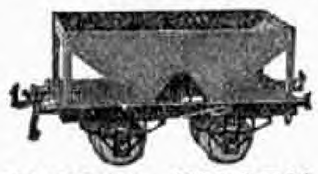


MO SIDE TIPPING WAGON
Tips to either side. Price, **1/-**

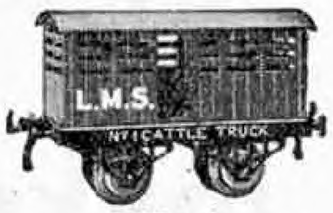




***BREAKDOWN VAN AND CRANE**
Sliding doors. For 2-ft. radius rails only. Price **5/11**



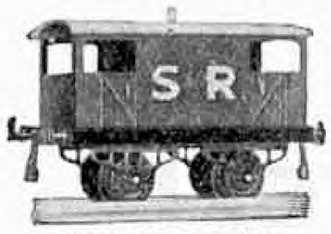
***HOPPER WAGON**
Mechanically unloaded. Price **3/6**



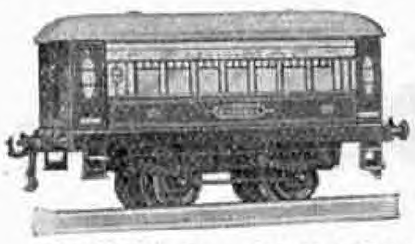
***No. 1 CATTLE TRUCK**
Sliding doors. Price **2/9**



CABOOSE
As used on American railways. Price **2/6**



BRAKE VAN
Opening doors. In N.E. or S.R. lettering. Price **2/11**



COACH, No. 1 PULLMAN
Price **2/9**



***GUARD'S VAN**
Price **2/6**



MO CRANE TRUCK
Crane revolves on its base. Price **1/-**



MILK TANK WAGONS
"NESTLE'S MILK"
Price **4/6**
"UNITED DAIRIES"
Price **4/6**



TANK CAR (American Type)
As used in America for the conveyance of oil, etc. Price **1/9**

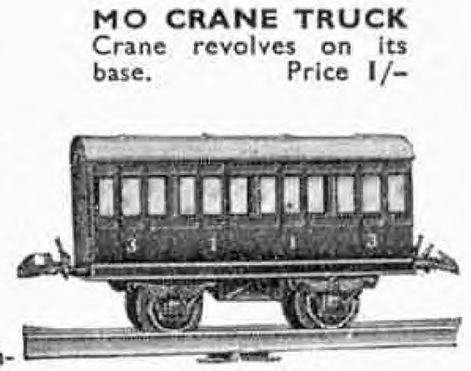


COACH, No. 1 PULLMAN COMPOSITE
Price **2/9**



***FLAT TRUCK**
Complete with Container. Price **2/-**

CONTAINERS
L.M.S.R. (Furniture),
L.N.E.R. (Goods),
G.W.R. (Insulated),
S.R. (Ventilated).
Price **6d.** each



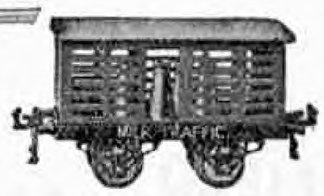
***COACH, No. 1 PASSENGER**
Price **2/6**



No. 1 PETROL TANK WAGON "REDLINE-GLICO"
Price **2/-**



COACH
No. O "SILVER JUBILEE"
Articulated. Finished in silver and grey. Price **1/9**

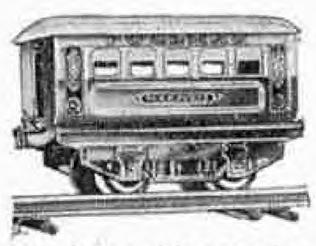


No. 1 MILK TRAFFIC VAN
Opening doors. Contains four milk cans Price **2/11**
Separate Milk Cans. Price, each **1½d.**

CABLE DRUM
(British Insulated Cables Ltd.)
Price **3d.**



No. 1 ROTARY TIPPING WAGON
Price **2/6**



COACH MI/2 PULLMAN
Price **1/-**

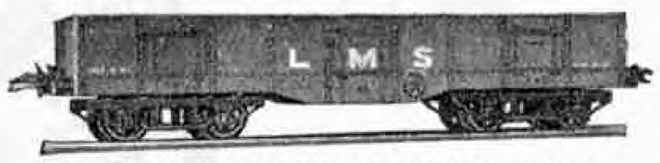


No. 1 PETROL TANK WAGON "ESSO"
Price **2/-**



OIL TANK WAGON "ROYAL DAYLIGHT"
Price **2/-**

***No. 2 LUGGAGE VAN**
Opening double doors. For 2-ft. radius rails only. Price **4/6**



No. 2 HIGH CAPACITY WAGON
Finished in correct colours of G.W.R. and L.M.S.R. "Loco Coal" Wagons, or L.N.E R. "Brick" Wagon. For 2-ft. radius rails only Price **3/9**



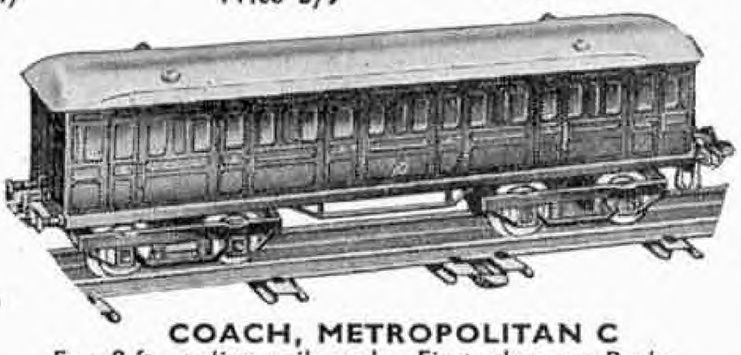
***REFRIGERATOR VAN**
Beautifully enamelled. Fitted with opening doors. Price **2/9**



PULLMAN CAR
American Type (as illustrated).
Lettered "Washington" or "Madison." Price **1/6**
Continental Type. "Mitropa" No. O
Lettered "Mitropa." Price **1/6**



WAGON
(French Type)
Lettered "NORD." Price **3/3**



COACH, METROPOLITAN C
For 2-ft. radius rails only. First class or Brake-third. Price **7/6**



COACH, RIVIERA "BLUE" TRAIN
"Dining Car" or "Sleeping Car."
For 2-ft. radius rails only. Price **12/6**

Lettered L.M.S., L.N.E.R., G.W. or S.R.

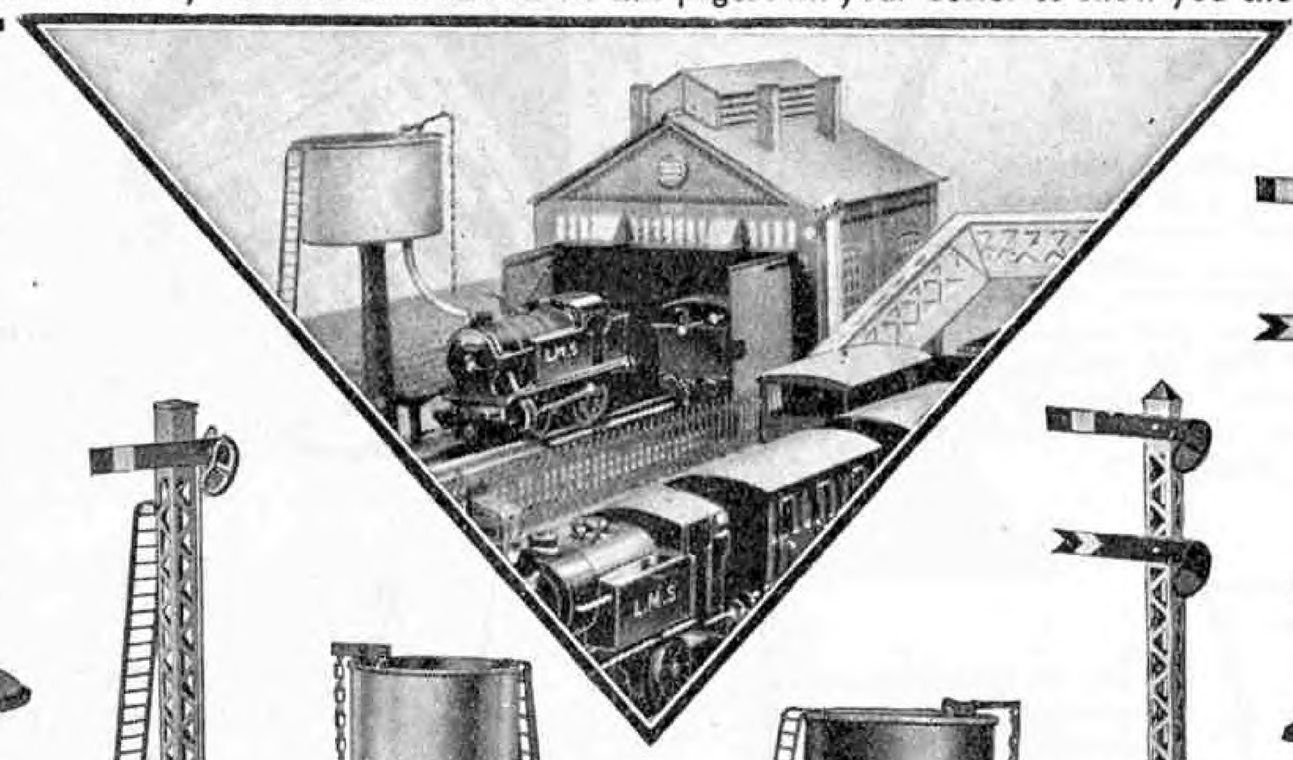
MECCANO LTD., BINNS ROAD, LIVERPOOL 13

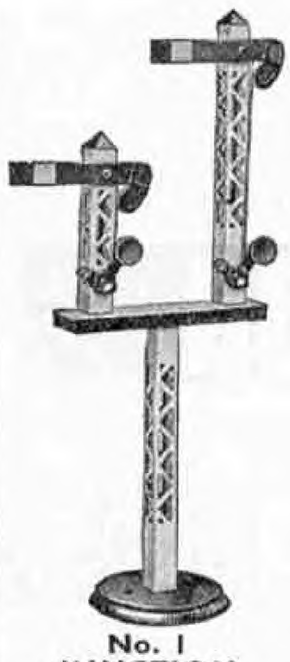
Hornby Series

HORNBY ACCESSORIES

Gauge O

There is a splendid range of Railway Accessories in the Hornby Series, each one built in perfect proportion and beautifully finished. With these realistic accessories the most elaborate model railway can be constructed and operated in exactly the same manner as a real railway.
A selection of Hornby Accessories is shown on this page. Ask your dealer to show you the full range.

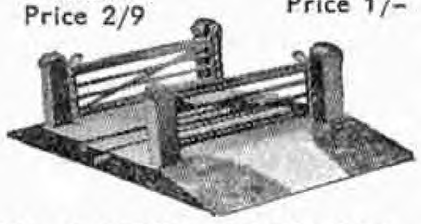




No. 1 JUNCTION SIGNAL
"Home" or "Distant."
Price 2/9



No. 1 SIGNAL
"Home" or "Distant."
Price 1/-



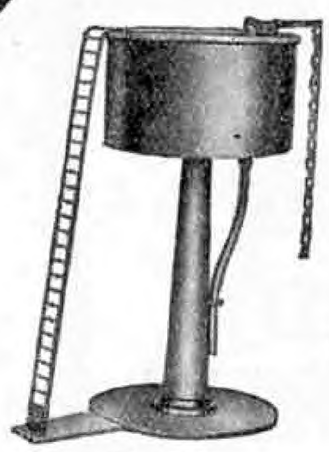
No. 1 LEVEL CROSSING
Suitable for a single track only and has gauge O rails in position.
Price 2/11



No. 2 SIGNAL
"Home" or "Distant."
Price 2/-



No. 1 WATER TANK
Height 7 in.
Fitted with flexible tube and valve lever.
Price 3/-



No. 2 WATER TANK
Height 9 in.
Fitted with flexible tube and valve lever.
Price 5/9

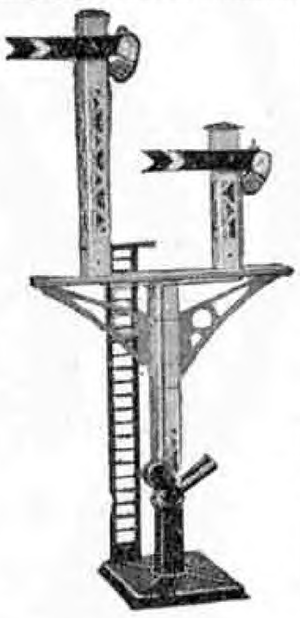


No. 1 SIGNAL, DOUBLE ARM
"Home" and "Distant."
Price 1/6

MECCANO LUBRICATING OIL
Price per bottle 6d.



No. 2 SIGNAL, DOUBLE ARM
"Home" and "Distant."
Price 2/6



No. 2 JUNCTION SIGNAL
"Home" or "Distant." Signal arms operated by levers at base. A very realistic model. Price 4/9



No. 2 LEVEL CROSSING
Measures 13½ x 10½ in., with two tracks of gauge O rails in position.
Price 5/6

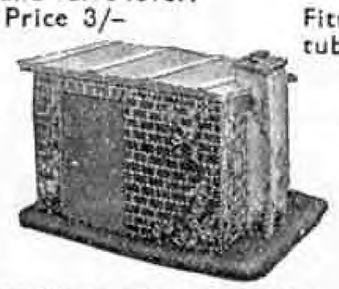
No. E2 LEVEL CROSSING (Electrical)
Similar to Level Crossing No. 2 excepting that a third rail is fitted in each of the two tracks.
Price 7/6



No. 1 BUFFER STOPS
(Spring type)
Price 1/-



No. 1 OILCAN
Price 6d.



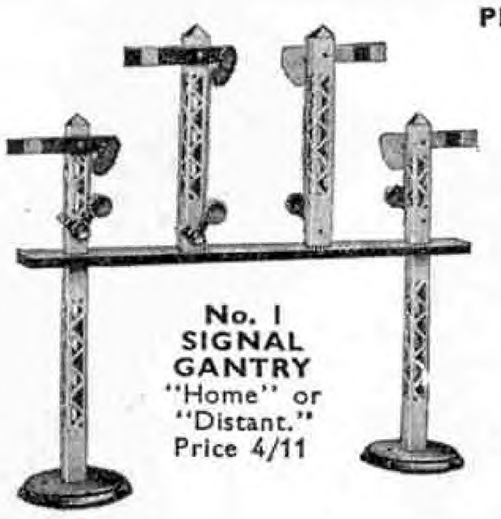
PLATELAYER'S HUT
Price 1/-



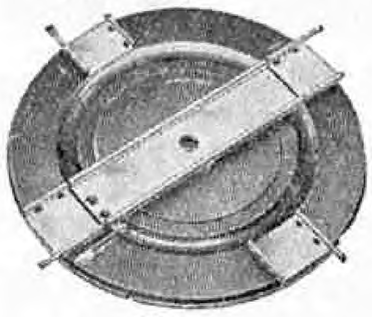
No. 2 OILCAN
("K" Type). The oil is ejected drop by drop by depressing the valve. Polished copper. Price 3/6



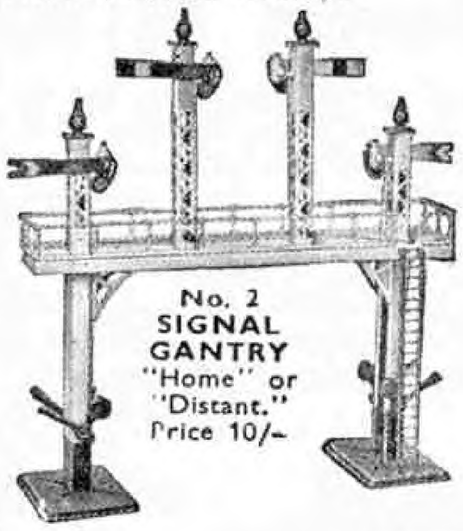
No. 1 SIGNAL CABIN
Finished in colours.
Price 2/6



No. 1 SIGNAL GANTRY
"Home" or "Distant."
Price 4/11



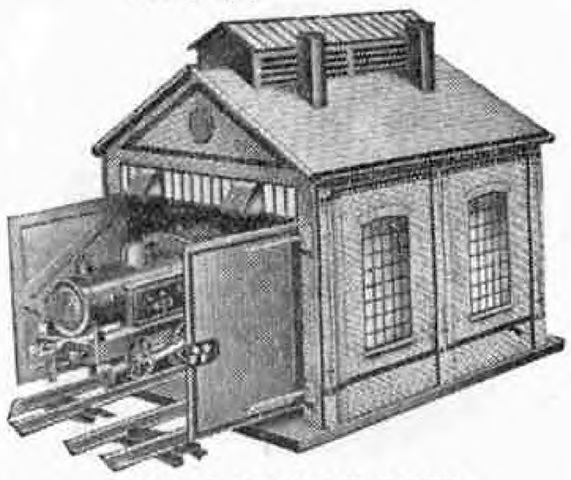
No. 1 TURNTABLE
Price 2/6



No. 2 SIGNAL GANTRY
"Home" or "Distant."
Price 10/-



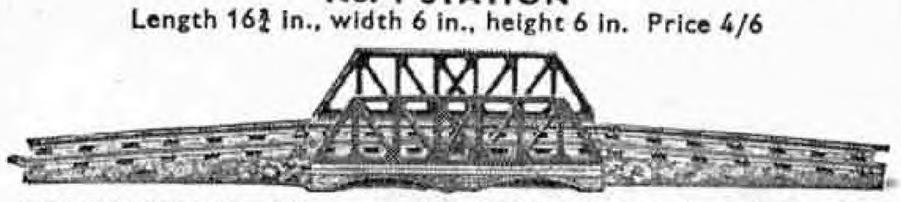
No. 2 SIGNAL CABIN
Dimensions: Height 6½ in., width 3½ in., length 6½ in. Roof and back open to allow Lever Frame to be fitted inside cabin if desired. Price 3/9



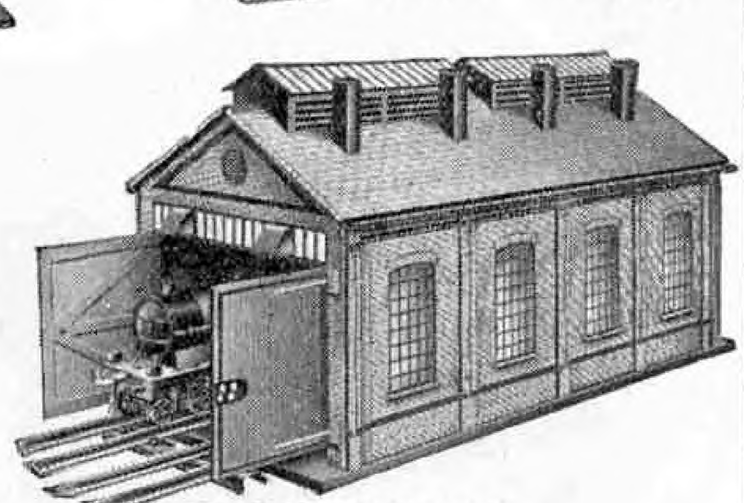
No. 1 ENGINE SHED
This Shed will accommodate any Locomotive and Tender with an overall length not exceeding 8¾ in. Price 15/-



No. 1 STATION
Length 16¾ in., width 6 in., height 6 in. Price 4/6



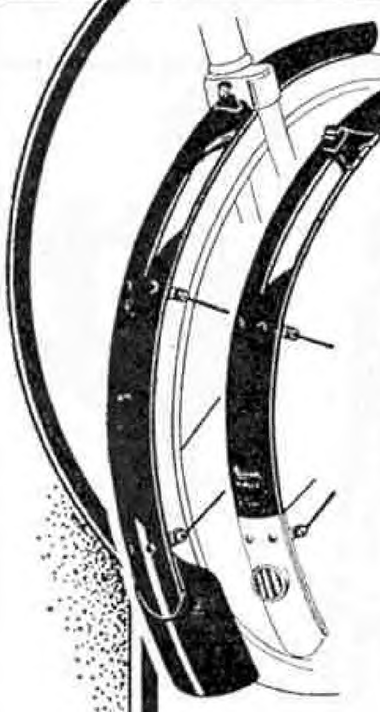
VIADUCT Price 6/6 **VIADUCT (Electrical)** Price 7/6
VIADUCT Centre Section only... ... ... Price 4/-
VIADUCT (Electrical) Centre Section only... ... Price 4/6



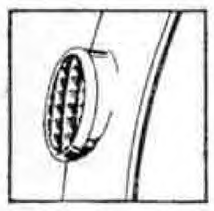
No. 2 ENGINE SHED
This Shed will accommodate any Locomotive and Tender with an overall length not exceeding 17½ in.
Price 22/6

MECCANO LIMITED — BINNS ROAD — LIVERPOOL 13

better for YOUR cycle



Bluemel's Celluloid Mudguards can be fitted to any cycle without interfering with the wheel adjustment. Quickly adjustable and detachable, with built-in mud flap on the front guard, in black. **Prices from 4/8 per pair.** Colours extra. If fitted with built-in "Prismatic" Reflector, as illustrated, 1/- extra.



Send for Bluemel's Pocket Catalogue containing interesting cycling data.

Bluemel's

CELLULOID MUDGUARDS

BLUEMEL BROS. LTD., Dept. 27, WOLSTON, Nr. Coventry

Every HANDY MAN Needs "3-in-One" Oil



Your tools last longer and work better if they are kept well lubricated and free from rust—so use "3-in-One" Oil. Excellent for all mechanical appliances, etc.

From Ironmongers and Stores

Oilright Can 8d. Handy Can 1/3. Also in bottles, 7d., 1/3 and 2/6 (8 ozs.)

CLEANS—LUBRICATES PREVENTS RUST

"3-IN-ONE" OIL

SKYBIRDS

SKYBIRD

A NEW JUNIOR MODEL
The "AERONCA-JAP" price 1/6

This set contains a complete cast and painted fuselage and leaves very little for the modeller to do, all units are complete for assembling. The ideal set for a beginner.

A Skybird constructional set makes a true scale 1/72 model aeroplane, a perfect replica of its type. Skybirds are easy to construct, these small models have achieved a world-wide popularity; they include well-known Civil and Military types from the Great War up to the very latest British 300 m.p.h. FAIREY "BATTLE." Prices from **1/6** to **12/6**.

There is also a large range of accessories available. Start your collection to-day—you will enjoy this hobby.

Write for a free price list. Send stamps 7d. for a copy of "THE AERO-MODELLER" which contains full particulars of this fascinating and instructive hobby.

A. J. HOLLADAY & CO. LTD. (Desk B),
3, Aldermanbury Avenue, London, E.C.2.

Hornby Automatic Circuit Breaker

A Device to Replace Fuses

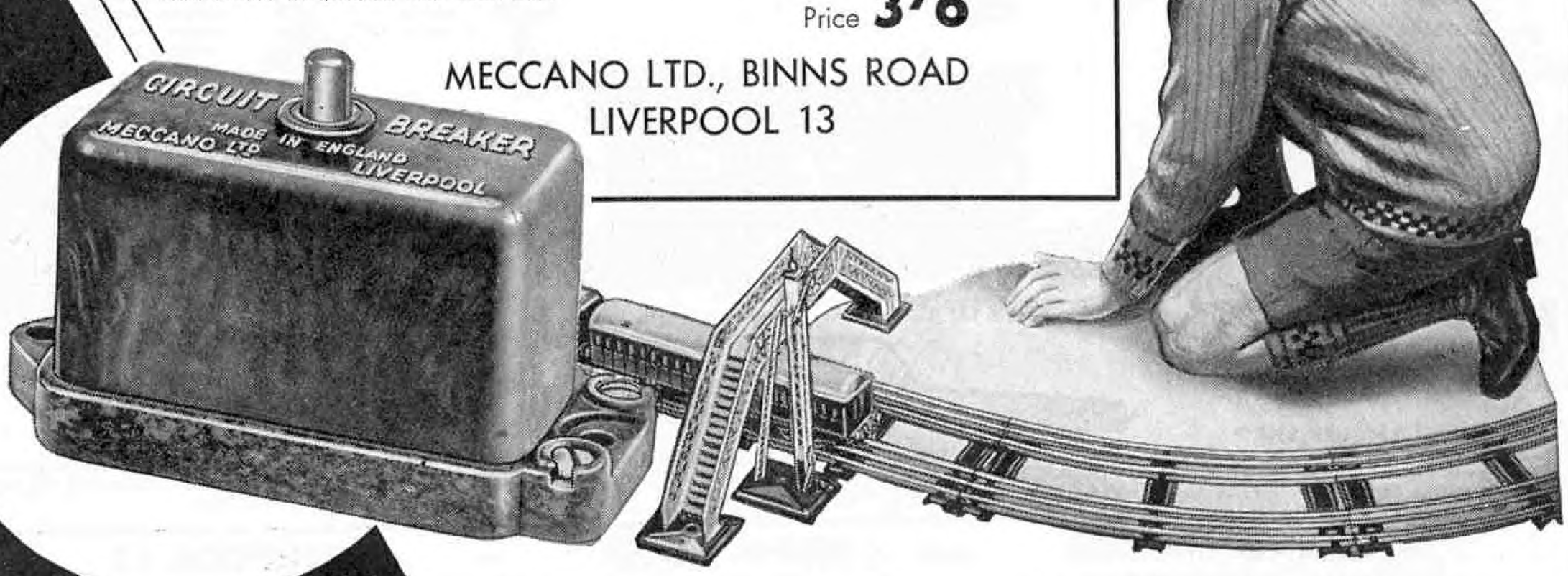
This automatic Circuit Breaker for Hornby Electric Railways does away with the necessity for the renewal of the fuse wire. If a short circuit occurs, the Circuit Breaker automatically disconnects the power supply from the track, and thus prevents the possibility of any damage to the Transformer or accumulator. When the cause of the trouble has been removed, the circuit is instantly restored by simply pressing a button on the top of the Circuit Breaker.

The Circuit Breaker is simple to connect and use, and does not require adjustment of any kind. It is suitable for both 20-volt and 6-volt trains. Full instructions are packed with each one.

Price **3/6**

MECCANO LTD., BINNS ROAD
LIVERPOOL 13





Win the S.M.A.E. contests

with the FROG "Competition Model"



COMPLETED MODEL—READY TO FLY—PRICE 49/6

also obtainable as a Constructor Kit price 15/-

This Model conforms to the S.M.A.E. formula and is eligible for official competitions. It has a maximum power duration of 90 seconds, but because of the efficient design and low wing loading, it will fly for much longer periods. When the elastic motor is unwound the combined free-wheeling and tensioner device allows the propeller to idle and at the same time prevents the elastic becoming loose enough to upset the centre of gravity. The elastic motor is enclosed in a balsa-wood cylinder, a unique feature which serves the double purpose of stiffening the fuselage and protecting it in case of a motor breakage.

Wing Span 38 ins. Weight 4 oz. Wing Loading 3.87 oz. per sq. foot.

★ GOOD NEWS FOR ENTHUSIASTS—**THE WAKEFIELD TROPHY MODEL** CONSTRUCTION KIT IS NOW REDUCED TO 21/-

IT IS THE BEST IN ITS CLASS

TRADE MARK REGD.

FROG MODEL AIRCRAFT

OBTAINABLE FROM ALL GOOD TOYSHOPS & STORES

All FROG model aircraft are covered by World Patents granted and pending.
Made in England by International Model Aircraft Ltd. **Sole Concessionaires:**

LINES BROS. LIMITED, TRI-ANG WORKS, MORDEN ROAD, MERTON, LONDON, S.W.19

COUPON To Lines Bros. Ltd. (Dept. 5), Morden Road, London, S.W.19

Please send me your "Frog" coloured leaflet with particulars of the "Frog" Flying Club and how to obtain handsome enamelled Air Force Pilot badges.

Name.....

Address.....

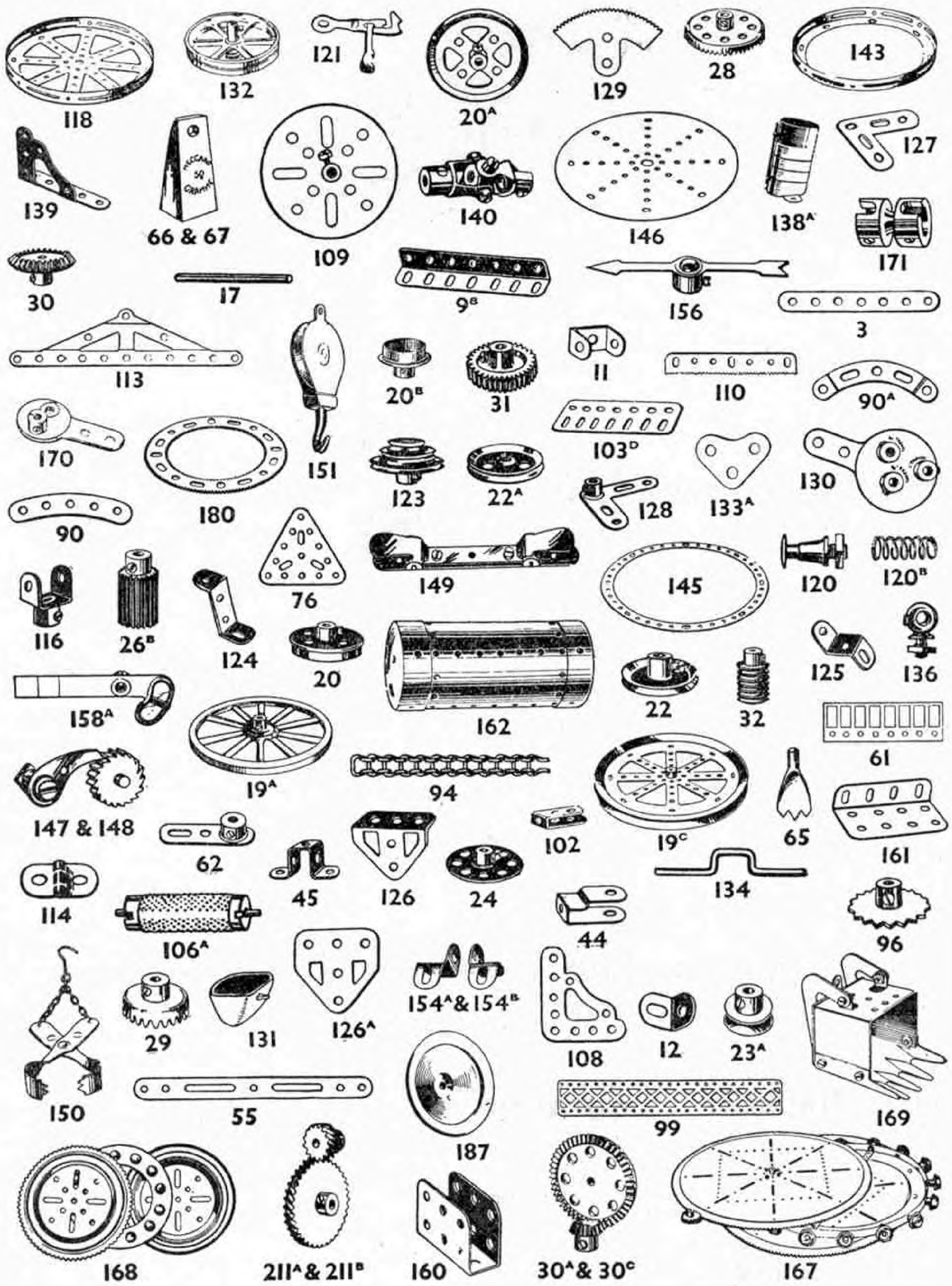
.....

Please write in block letters. 4/37

MECCANO
PARTS AND ACCESSORIES

Meccano parts, many of which are illustrated below, combine to form a complete miniature engineering system with which practically any movement known in mechanics can be correctly reproduced. New parts are always being introduced in order to keep Meccano model-building in line with the most modern engineering requirements. The greatest care is taken in the designing of these parts to ensure that they function exactly as their counterparts in actual engineering practice. Ask your dealer for the latest complete illustrated price list.

MECCANO LTD., Binns Road, LIVERPOOL 13



Prices of Parts Illustrated

No.			s.	d.
5	Perforated Strips, 3½" ...	½ doz.	0	4
9b	Angle Girders, 3½" ...	„	0	8
11	Double Brackets	doz.	0	3
12	Angle Brackets, ½" × ½" ...	„	0	2
17	Axle Rods, 2"	3 for	0	1
19a	Wheels, 3" diam. ...	each	0	6
20	Flanged Wheels, 1½" diam	„	0	5
20b	„ „ ½" „	„	0	3
	Pulley Wheels			
19c	6" diam., with centre boss and set screw... ...	„	1	9
20a	2" diam., with centre boss and set screw... ...	„	0	4
22	1" diam., with centre boss and set screw... ...	„	0	3
23a	½" diam., with centre boss and grub screw ...	„	0	3
22a	1" diam., without centre boss and grub screw...	„	0	2
24	Bush Wheels	„	0	4
26b	Pinion Wheels, ½" diam., ¾" face...	„	0	6
28	Contrate Wheels, 1½" diam.	„	0	9
29	„ „ ¾" „	„	0	6
30	Bevel Gears, ¾", 26 teeth	„	0	7
*30a	„ „ ¾", 16 „	„	0	6
*30c	„ „ 1½", 48 „	„	1	6
31	Gear Wheels, 1", 38 teeth	„	0	10
32	Worms	„	0	4
44	Cranked Bent Strips ...	„	0	1
45	Double „ „ ...	„	0	1
55	Perforated Strips, slotted, 5½" long	doz.	1	6
61	Windmill Sails	4 for	0	6
62	Cranks	each	0	3
65	Centre Forks	„	0	1
66	Weights, 50 grammes ...	„	0	9
67	„ 25 „ ...	„	0	6
76	Triangular Plates, 2½" ...	„	0	2
90	2½" Curved Strips, 2⅛" rad.	„	0	1
90a	2½" cranked, 1⅛" rad.	„	0	1
94	Sprocket Chain, per 40" length		0	6
96	„ Wheels, 1" diam.	each	0	3
99	Braced Girders, 12½" long	½ doz.	2	6
102	Single Bent Strips ...	each	0	1
103d	Flat Girders, 3½" long ...	½ doz.	0	7
106a	Sand Rollers	each	1	9
108	Architraves	doz.	1	6
109	Face Plates, 2½" diam. ...	each	0	4
110	Rack Strips, 3½"	„	0	2
113	Girder Frames	„	0	3
114	Hinges	pair	0	4
116	Fork Pieces, Large ...	each	0	3
118	Hub Discs, 5½"	„	1	3
120	Buffers	„	0	2
120b	Compression Springs ...	„	0	1
121	Train Couplings	„	0	1
123	Cone Pulley	„	1	3
124	Reversed Angle Brackets, 1"	½ doz.	0	4
125	Reversed Angle Brackets, ½"	„	0	2
126	Trunnions...	pair	0	3
126a	Flat Trunnions	each	0	1
127	Simple Bell Cranks ...	„	0	1
128	Boss Bell Cranks... ...	„	0	3
129	Rack Segments, 3" diam.	„	0	5
130	Eccentrics, Triple throw	„	1	0
131	Dredger Buckets... ...	„	0	2
132	Flywheels, 2¾" diam. ...	„	2	0
133a	Corner Brackets, 1" ...	„	0	1
134	Crank Shafts, 1" stroke ...	„	0	2
136	Handrail Supports ...		0	3
†138a-z	Ships' Funnels, Raked ...		0	9
139	Flanged Brackets (right)		0	2
140	Universal Couplings ...	„	0	10
143	Circular Girders, 5½ diam	„	1	0
145	Circular Strips, 7½" diam	„	0	9
146	Circular Plates, 6" diam	„	1	0
147	Pawls	„	0	3
148	Ratchet Wheels	„	0	6
149	Collecting Shoes	„	1	3
150	Crane Grabs	„	0	7
151	Pulley Blocks, Single Sheave	„	0	8
154a	Corner Angle Brackets ½" (right hand) ...	½ doz	0	6
154b	Corner Angle Brackets, ½" (left hand)... ...	„	0	6
156	Pointers, 2½" over al ...	each	0	4
158a	Signal Arms, Home ...	„	0	5
160	Channel Bearings, 1½" × 1" × ½"...	„	0	2
161	Girder Brackets, 2" × 1" × ½"	2 for	0	3
162	Boiler, Complete ...	each	1	0
167	Geared Roller Bearings ...	„	20	0
168	Ball Bearing, 4" diam ...	„	3	0
169	Digger Buckets	„	1	6
170	Eccentrics, ½" throw ...	„	0	9
171	Socket Couplings ...	„	0	9
180	Toothed Gear Rings, 3½" diam. 133 teeth external, 95 teeth internal...		2	0
187	Road Wheels	„	0	3
*211a	Helical Gear, ½" ...	„	0	9
*211b	„ „ 1½" ...	„	2	0

*Can only be used together.

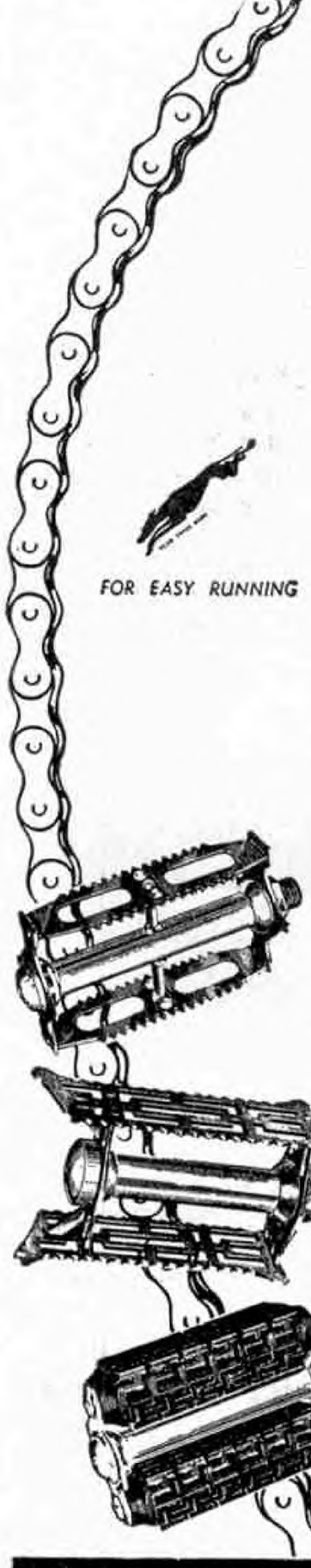
†The series includes 26 different Funnels.

PROUD OF HIS BIKE?



You bet he is!

Like every Meccano builder he knows a thing or two. Knows, for instance, that there's no chain like a RENOLD CHAIN for easy running and long life. Knows too, that those handsome pedals you so often see on club cyclists' machines are BRAMPTON MARK 10 PEDALS. He has a RENOLD CHAIN and BRAMPTON PEDALS fitted to *his* bicycle—and don't the other fellows envy him!



You can obtain a
RENOLD
CYCLE CHAIN
for 3/6
and
BRAMPTON
MARK 10 PEDALS
for 2/2 a pair
CHROMIUM FINISH
from a Cycle Dealer

THE RENOLD AND COVENTRY CHAIN CO. LTD.
MANCHESTER, ENGLAND.

BETTER SPORT THAN EVER

for you with **SCUD** aircraft. Two new marvellous models. The **ENVOY** low wing fuselage monoplane. Price 12/6. Span 27", Length 22". Note the size! Steel framed elliptical wing. And here's another winner—the **CORONATION** monoplane with tubular fuselage. Span 17½". Price 5/6. If you like model aircraft that really fly, you **must** get a machine from the **SCUD** range.

SCUD MODELS LTD

SEND NOW FOR FREE ILLUSTRATED CATALOGUE

Lovaine Crescent Model Works (Dept. M.M.), Newcastle'Tyne 2

Build your own engine

Only a few hand tools required.

Stuart No. 10.
Completely machined set with full instructions:
from **18/6** post free.

All our sets from **5/-** upwards, illustrated and described in our No. 2 catalogue, 6d. post free.

72 pages fully illustrated.

STUART TURNER LTD.
Henley-on-Thames





This
Miniature Yacht will win Races:
it's Clyde-built!

Specifications as regulation Racing Yachts. Hulls built (not gouged out) from seasoned timber.

● Finger-tip self-steering ● cambered decks ● Union-silk sails ● lead alloy keels ● Bermuda rigged. Get one of these staunch stream-lined Yachts.

L.O.A. 24 ins. model as photo £2-5 as supplied H.M. the Queen when Duchess of York.

We pay carriage anywhere in U.K. *Satisfaction guaranteed.*

Fill in—tear out post coupon to-day for FREE catalogue

Clyde Craft Ltd.
Busby
Glasgow
Scotland

Name.....
Address.....
.....

Write in BLOCK LETTERS. Post unsealed ½d. envelope. M.M.2.

howats

TRI-ANG YACHTS

SPEED BOATS, ELECTRIC CABIN CRUISERS
COASTAL STEAMERS, FISHING SMACKS
CLOCKWORK STEAM DRIFTERS, RACING YACHTS

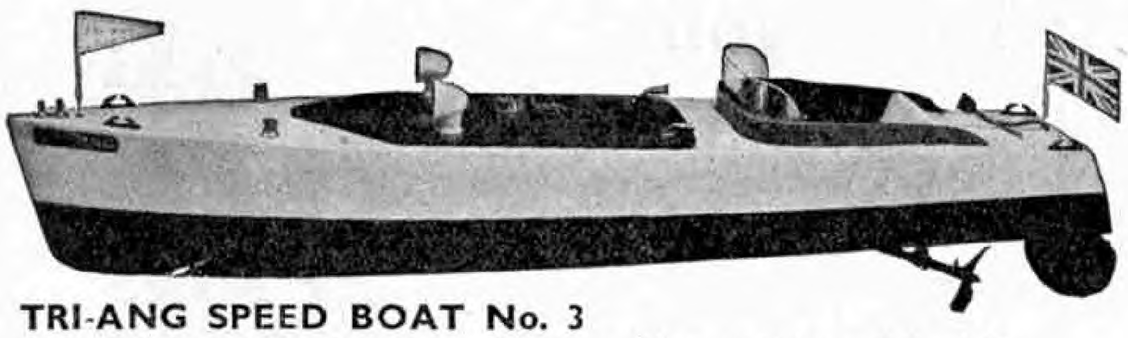


K SPEED BOAT No. 1
Fitted with powerful mechanism, windscreen, dummy ventilators, control lever and adjustable rudder. Hull 16 in. overall. Price **6/6**

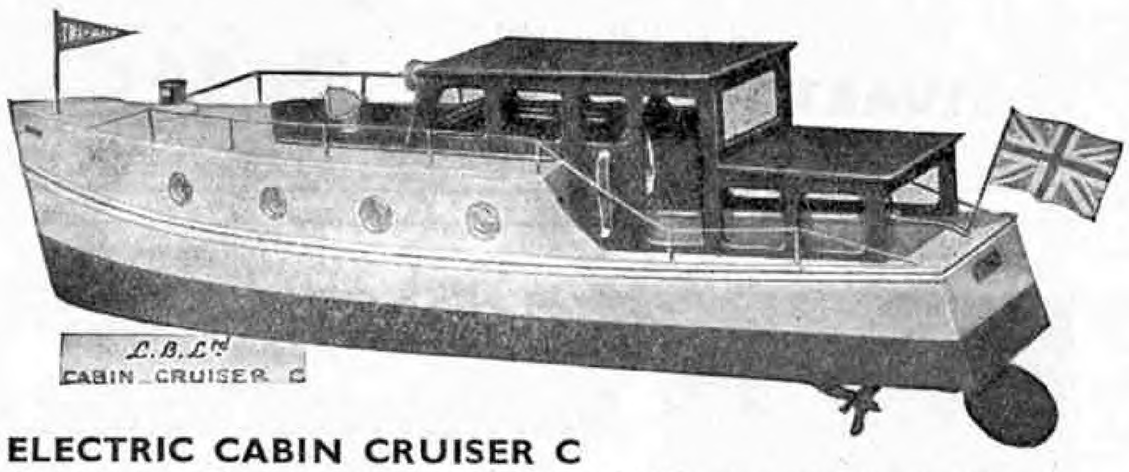
L. BROS. LTD. LONDON BROS ENGLAND
TRI-ANG TOYS
REGD. TRADE MARK



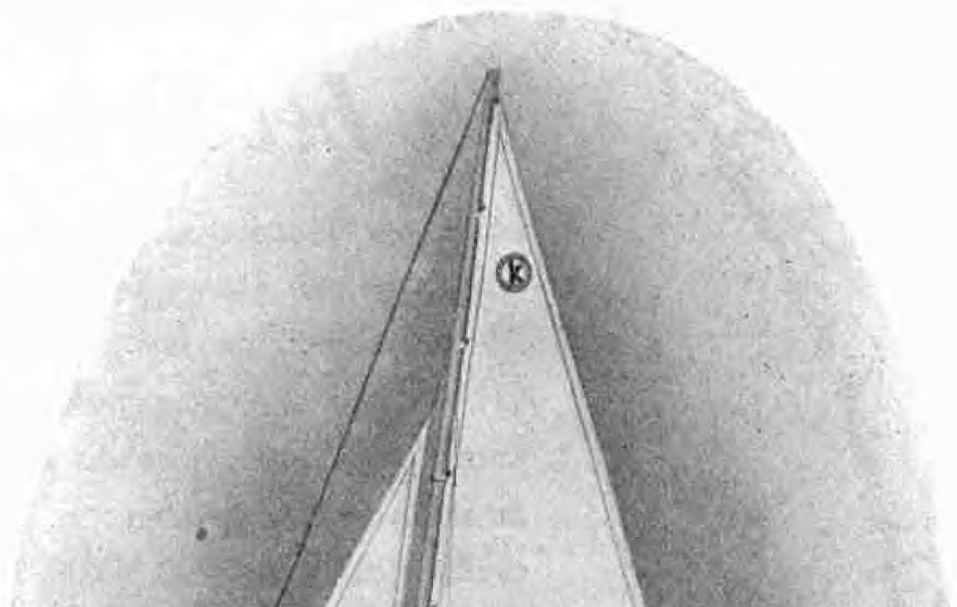
FISHING SMACK
Magnificent model with folding mast and boom. Adjustable sails, properly weighted lead keel. Supplied complete with Anchor. Specially suitable for shallow water. Length of hull 17 in. Price **15/-**



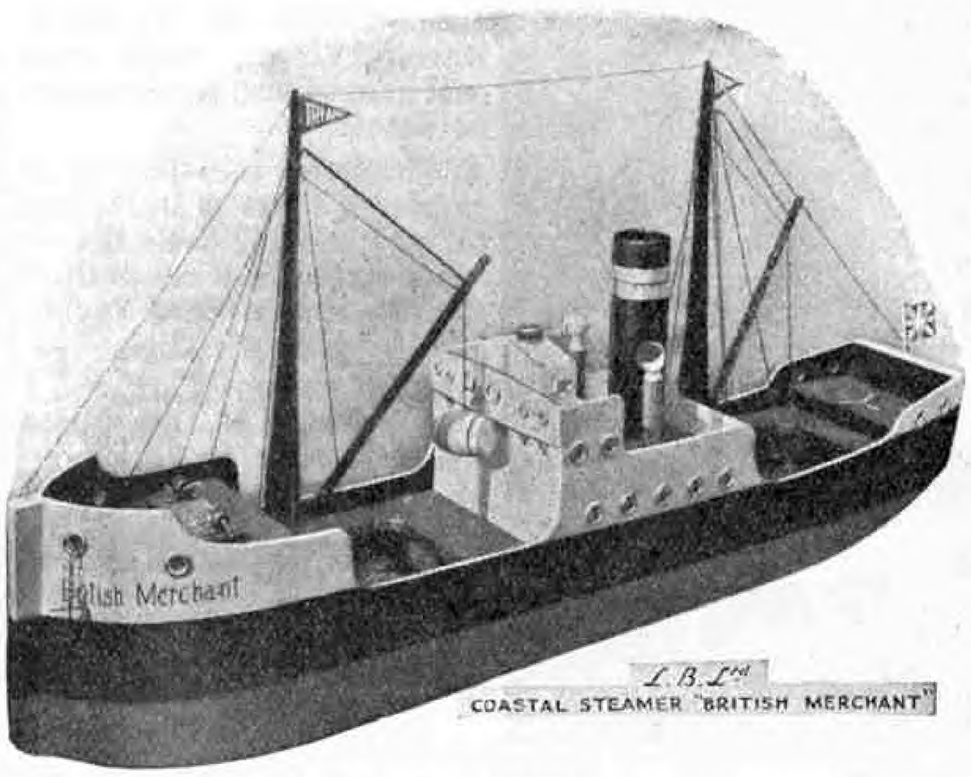
TRI-ANG SPEED BOAT No. 3
Specially designed hull with mahogany deck, brass fittings, ventilators and detachable motor cover. Very powerful clockwork mechanism. Complete with bow pennant and stern flag. Hull 20½ in. overall. Price, CLOCKWORK **21/-**, ELECTRIC **25/-**



ELECTRIC CABIN CRUISER C
Model luxury Cabin Cruiser. Fitted with illuminated Cabin, port and starboard lights, detachable mahogany superstructure. Separate switches for lights and motor. Complete with bow pennant, stern flag and dummy ventilators. Length of hull 28 in. Price **49/6**



K YACHT "MARGARET"
Magnificent craft with AUTOMATIC STEERING. Patent lightweight weather resisting hull. Solid mahogany polished deck. Mast and boom made from finest selected material, best quality sails, fully adjustable. Beautifully finished in Blue and White. Length of hull 26 in.
Price **22/6**



COASTAL STEAMER "BRITISH MERCHANT"
Exceptionally strong clockwork motor. Two working derricks. Dummy ventilating shafts, portholes and navigating lights. Anchor and chain. Two holds with dummy cargo. Hull finished in red and black with white superstructure. Overall length 30 in.
Price **29/6**

OBTAINABLE AT ALL THE BEST TOY SHOPS AND STORES

Made by LINES BROS. LTD., Tri-ang Works, LONDON, S.W.19

NEXT MONTH: "SPINNING TOPS THAT STEER SHIPS." PUBLISHING DATE: 1st MAY

MECCANO MAGAZINE

Editorial Office:
Binns Road, Liverpool 13
England

Vol. XXII. No. 4
April, 1937

With the Editor

World Airways Developments

The extent to which airways are spreading over the world is shown by the preparations now being made by European airway companies. This year 60,000 miles of European airways will be covered by high-speed flights. Express routes, such as that by which passengers can leave London after breakfast and be in Budapest for dinner on the same evening, will be in operation, and there will be a general speeding up of connecting services.

Imperial Airways will play a very prominent part in these services. Its machines, with those of its subsidiary and associated companies, are now flying more than 20,000 miles every day over routes nearly 30,000 miles long. This is a remarkable contrast to the position in 1924, when the company was flying over 1,700 miles of routes.

Actually we are on the threshold of even more important developments, for Atlantic air services are now in sight. The great flying boats that will undertake flights between Great Britain and America are now beginning their long range experimental work. In addition, four-engined high speed land machines for further experimental flights to be started before the end of this year are on the point of completion; and the possibility of catapulting long range flying boats also is being examined.

It is interesting to see the position that Canada will hold when these schemes are carried further. That country has already developed its own air lines to a considerable extent, and the provision of Pacific air services from Vancouver to Australia and New Zealand is being considered. With the establishment of these services, and of one across the Atlantic Ocean, Canada will become a vital link in a chain of Empire air communications that will pass round the world, for Great Britain and Australia are already closely connected by the existing route of Imperial Airways.

The Fascination of Freak Names

The "Animalesques" contest in the January issue of the Magazine proved to be one of the most popular ever announced in the "*M.M.*" The novelty of the competition no doubt was responsible in large part for the record entry. It will be remembered that readers were asked to build up words from the clues to their two overlapping parts. Most of the solutions were long words. There is always something attractive in a long word, whatever it may mean, providing it has a good sound to it; and the solutions in our "Animalesques" contest certainly were imposing! For instance, among them were "narwhallucination," which suggests something extremely formidable; and "ferretriever," an excellent name for a dog that has been trained to find things and bring them with lightning speed and agility. "Elephantimacassar" and "hippopotamushroom" also have attractions of their own; there is something irresistibly comic about the combination that each presents of the huge and the insignificant. I shall give a full list of the strange words that form the solution to this puzzle as soon as possible.

Modern Inventions

Another contest that has produced an exceptionally interesting result was the "Modern Inventions" Voting Contest announced in the November 1936 issue, in which eight modern inventions were to be placed in order of importance. In view of the great part that radio plays to-day, it is scarcely surprising to find that broadcasting easily headed the list, securing more votes than all the rest of the inventions put together. Readers showed sound sense in dealing with the remaining inventions, basing their opinions on the extent to which everybody would benefit rather than on anything of a spectacular character. Thus the gyro compass and stainless steel followed broadcasting, and talking pictures and the preselector gear box came last. Talking pictures of course are very popular, and probably were ranked so low because their appeal is largely one of entertainment.

A very striking feature of this contest is that overseas readers were of exactly the same mind in regard to the order of importance of inventions in the list as those in the home section. In the overseas section also broadcasting secured more votes than all the rest of the inventions put together, and the remaining inventions were not only placed in the same order, but received the same proportion of votes.

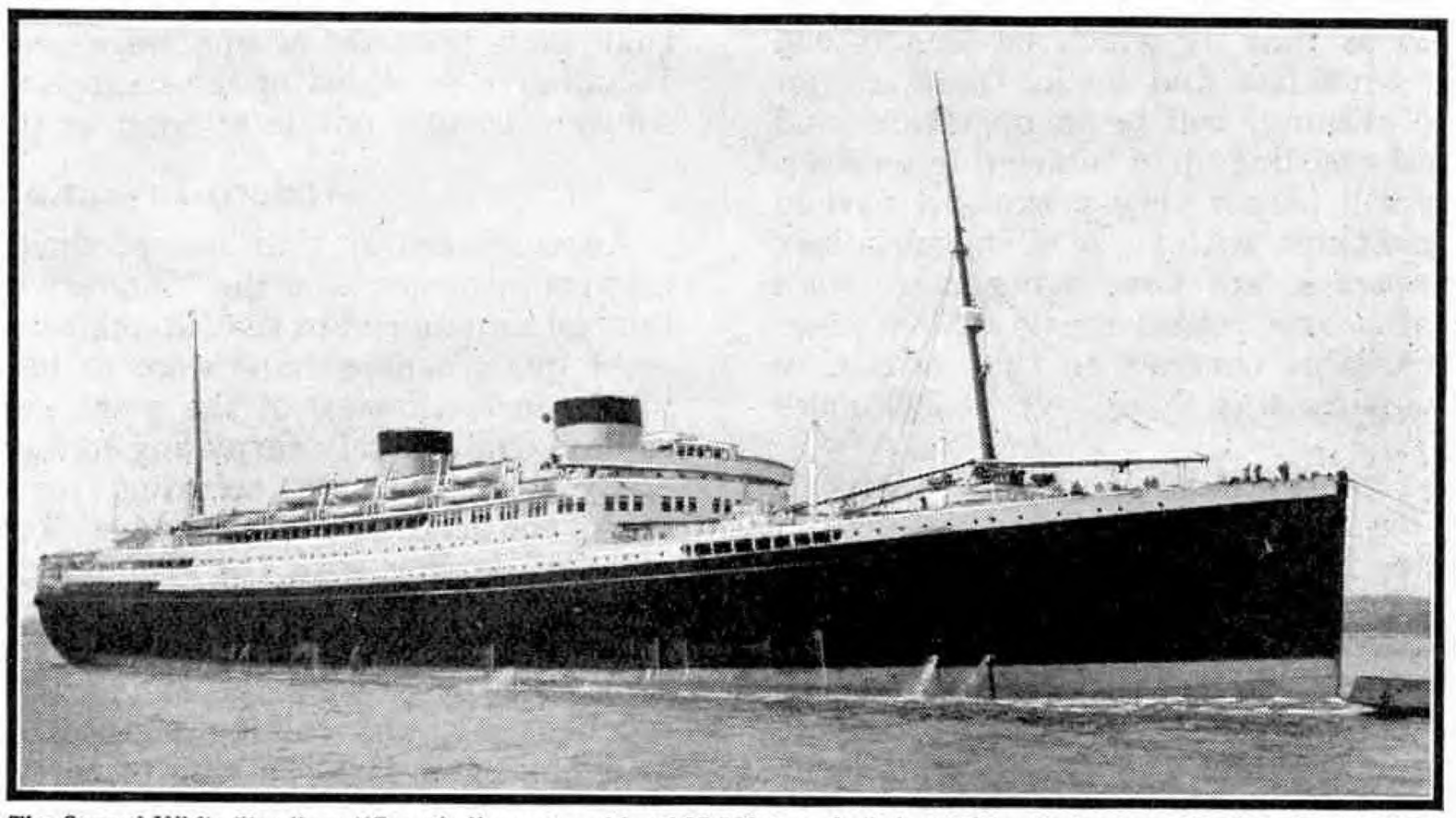
Speaking of inventions reminds me of the walking dragline illustrated and described on page 192 of this issue. Its striding action makes me wonder what our world would have looked like to-day if the wheel had never been invented. Possibly means would have been devised of making vehicles move on jointed legs, like those of animals. Machines that travelled in this manner were described in one of Mr. H. G. Wells' scientific romances, which tells of an invasion of the Earth by intelligent beings from Mars. The invaders appeared to know little of the wheel, but they thoroughly understood levers and joints, and their machines had long metal legs on which they strode about the countryside at great speed. To us, a world in which vehicles travelled on legs instead of wheels would be something of a nightmare!

The Atlantic Ferry

One Hundred Years of Steamship Progress

IT is almost 100 years since the first Atlantic crossing was made by a vessel running entirely under steam. The first effort to introduce steamships for transatlantic service was made in 1836, when the British Queen Steam Navigation Company was formed and a contract was placed for the construction of a paddle steamer to be named the *"British Queen."* Great publicity was given to this innovation, and the actual date of departure was fixed but delays in building the vessel compelled the company to borrow the channel steamer *"Sirius"* from the Cork Steamship Company to make the advertised voyage instead of the *"British Queen."* The substitute was only 178 ft. long and of 703 tons register. She left Queenstown on 28th March 1838 amid great enthusiasm, carrying 94 passengers.

In the meantime enterprising rivals at Bristol had formed the Great Western Steamship Company, and had built the steamship *"Great Western"* for the Atlantic service. This company also encountered difficulties. The *"Great Western"* caught fire while being taken round the south coast to Bristol, and as extensive repairs were necessary she did not leave for New York until three days after the departure of the *"Sirius."* A great race followed. The *"Great Western"* was the faster vessel, but she could not quite overhaul her rival, which reached New York a few hours ahead of her. There was great excitement when the *"Sirius"* arrived. This was intensified when shortly afterwards the *"Great Western"* was sighted making its way to port, and the achievements of the two vessels were celebrated with the greatest enthusiasm.



The Cunard White Star liner "Georgic," a motor ship of 27,760 tons, built in 1932 by Harland and Wolff Ltd., at Belfast. The illustrations to this article are by B. and A. Fielden, Blundellsands, Liverpool 23.

The *"Sirius"* took 16½ days over the voyage. The *"Great Western"* made the passage in three days less, and equalled the fastest time of the best sailing ships then making the crossing. She therefore can be looked upon as the first holder of the Blue Riband of the Atlantic, the mythical trophy for which ships of five nations have contended in struggles for supremacy that have formed one of the greatest romances of the sea.

The British Government had realised the superiority of the steamship over the sailing ship for carrying mail, and in 1838 decided to invite tenders for their carriage by steamship to and from America. The news of this reached Samuel Cunard, a merchant of Halifax, Nova Scotia, who for many years had vainly tried to interest people in a scheme for building steamships for this very purpose. Cunard now came to Great Britain and there was recommended by Robert Napier, a famous Clyde steamship builder, to John Burns of Glasgow and David McIver of Liverpool, who were partners in a coasting steamship business. They became interested in his schemes, and a company was formed to build ships and to put in a tender for carrying mails.

This was the beginning of the Cunard Line, and the company was first known as the British and North American Royal Mail Steam Packet Co. In the face of keen competition from the owners of the *"Great Western"* the Government contract was secured. This meant a subsidy of £60,000 a year, later raised to £81,000, for providing a regular service with four vessels, and steps immediately were taken to have these built. These vessels were named *"Britannia," "Arcadia," "Colombia"* and *"Caledonia."* All were launched in 1840, but the *"Britannia"* was the first to be completed, and can be regarded as the first Cunarder. She was only 207 ft. long and had a tonnage of 1,154. Thus she would have been in striking contrast with *"Queen Mary,"* the most recent Cunarder, if the two could have been seen side by side, for the entire hull of the older vessel could have been passed through any one of the funnels of the *"Queen Mary."* Her engines developed only 740 h.p., giving an average speed of 8.5 knots. She did not distinguish herself greatly on her maiden voyage, taking 14 days 8 hrs. over the passage. She returned from Halifax to Liverpool in 10 days, however, averaging 10.56 knots, and thus gained the Blue Riband, which afterwards was held by other Cunarders, among them the *"Cambria,"* which made a voyage from Halifax to Liverpool at an average speed of 12.3 knots.

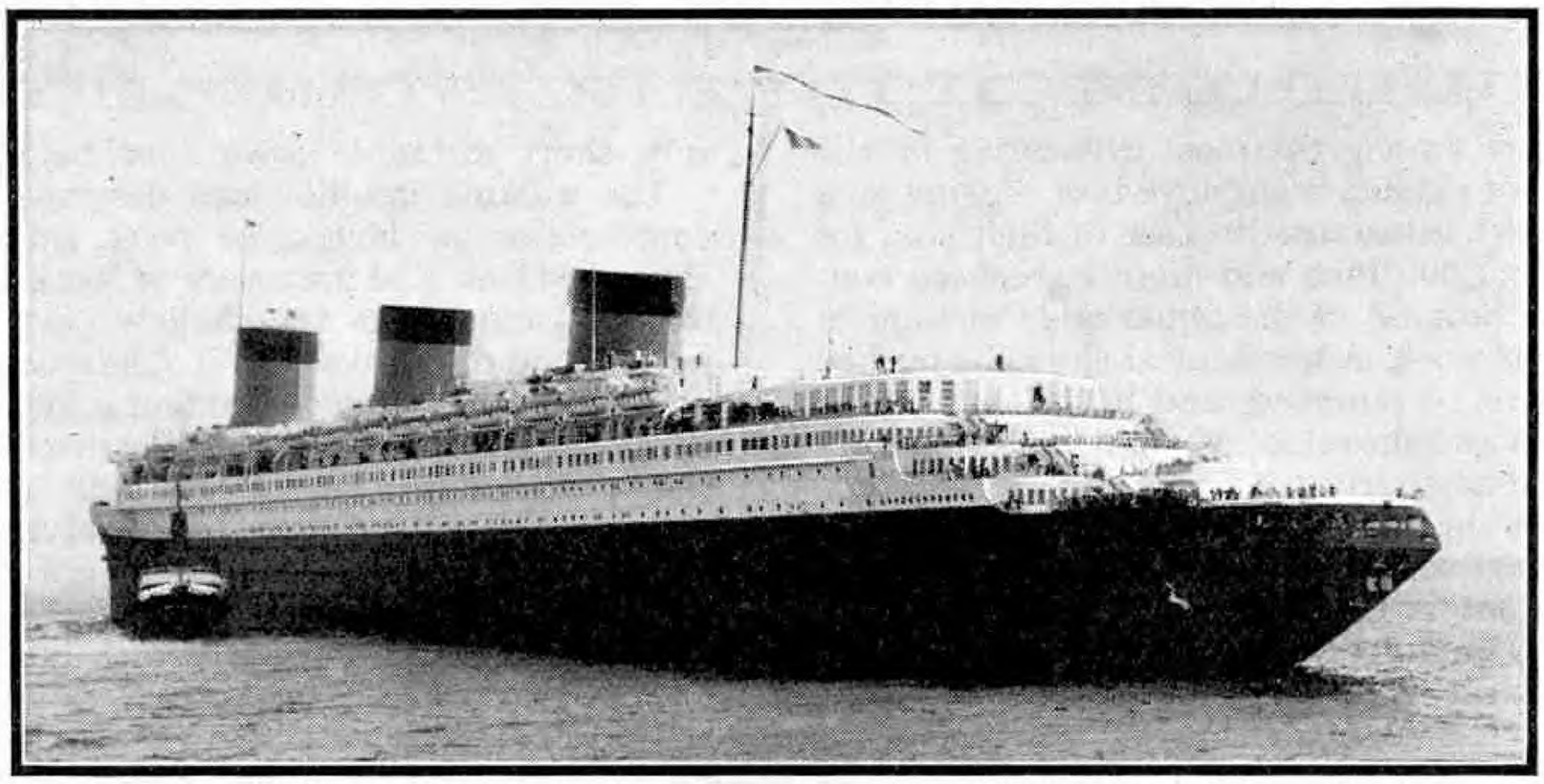
Commerce between the two countries served by the Cunard Line continued to increase, and more vessels were added to the fleet. The success of the venture then began to stimulate rivals to efforts to share in it, and by 1850 there were seven or eight lines running between Liverpool and New York. Then came a really serious challenge from the United States, the Government of which was persuaded to subsidise a line organised by Mr. K. E. Collins, the owner of a fleet of sailing vessels. This was the beginning of the Collins Line. Four wooden paddle steamers, each with a tonnage of nearly 3,000, were built. These vessels were larger and speedier than the Cunarders of that time, from which they wrested the Blue Riband. Their fittings were costly and luxurious, and far superior to anything previously seen in steamships.

In spite of the size, speed and luxury of its ships, the Collins Line was a failure financially, and serious disasters to two vessels of the fleet hastened its downfall. The end of the Collins Line brought into prominence a more serious competitor. This was William Inman of Liverpool, who believed that iron vessels fitted with screw propellers were superior to the wooden paddle steamers of those days. Inman was interested also in the emigrant trade, then carried on practically only by slow sailing vessels, in which great hardships were endured. His idea was to attract emigrants as well as passengers paying high rates for cabin accommodation, and in 1850 he bought the *"City of Glasgow,"* then the only vessel that appeared to fulfil his requirements. The *"City of Glasgow"* sailed for Philadelphia in December of that year. She did not long remain the only vessel of the Line, for in the following year a second iron steamship, the *"City of Manchester"* was acquired, and other vessels were then built or purchased. The American port was changed from Philadelphia to New York in 1856, and the rivalry between the Inman and Cunard Lines then became intense. When one line built a ship, the other produced a larger and faster vessel, but the Inman Line kept well ahead in this fierce contest.

In the meantime efforts were made to form other steamship lines in the North Atlantic trade, but these failed to make any real impression on the Cunard and Inman Companies until the appearance of the White Star Line. The older lines were so firmly established that it seemed the height of rashness to challenge them. This did not deter T. H. Ismay, the founder of the new Line, and he quickly made his presence felt in his new sphere of activity, building large vessels remarkable for their comfortable passenger accommodation. The first vessel of the new Line was the *"Oceanic,"* which

began her first voyage on 2nd March, 1871. Later came the *"Britannic"* and *"Germanic,"* built in 1874 and 1875 respectively. These vessels were of 5,000 tons, and had speeds of 16 knots. They were the fastest vessels that had so far appeared, and for the first time in history the Atlantic was crossed in less than a week.

The Cunard Line in the meantime had followed the example of its rivals by building iron screw steamships of ever-increasing size and speed. Then came the steel ship. The first steel Cunarder was the *"Servia,"* of 7,392 tons, with a speed of 17 knots, completed in 1881. Many famous vessels followed her, among them the *"Etruria,"* which held the Blue Riband from 1885 to 1888 with a speed of 19.57 knots. The *"City of Paris"* regained the honour for the Inman Line, only to lose it to the *"Teutonic"* and the *"Majestic"* of the White Star Line. Then in 1893 came the famous Cunard greyhounds *"Campania"* and *"Lucania."* These were small vessels by modern standards, for they were of 12,952 tons; but were the finest and fastest liners in the world when they made their appearance. The *"Lucania's"* record voyage from Queenstown to New York occupied 4 days 11 hrs. 40 min. at a speed of 21.82 knots, and she maintained her position until 1898, when there came a challenge from an entirely new quarter. In that year the Norddeutscher Lloyd Company entered the field with two great new vessels. This was the first attempt to wrest the supremacy of the North Atlantic from British hands since the disappearance of the ill-fated Collins Line. Of the two German vessels designed for the attack, only the first entered the service. She was the *"Kaiser Wilhelm der Grosse,"* a vessel of 19,360 tons, and broke all records by making a westward crossing at 22.29 knots, and completing a voyage eastward at 22.51 knots. The *"Deutschland,"* another German vessel, then took up the running. She belonged to the Hamburg-American Line and secured the record in 1900. Her best voyages westward and eastward were made in 1901 at speeds of 23.15 and 23.51 knots respectively.



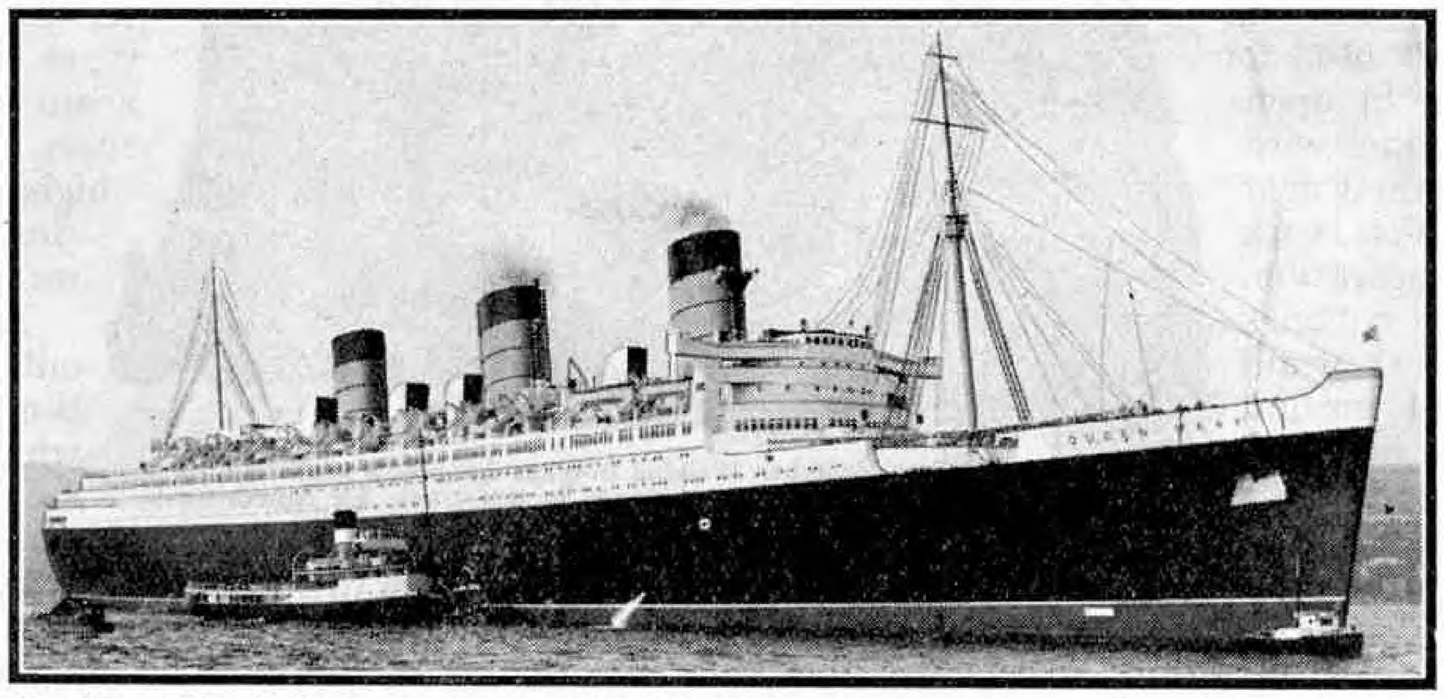
The turbo-electric liner "Normandie," owned by the Compagnie Générale Transatlantique. This vessel won the much-coveted Blue Riband of the Atlantic in June 1935, making her maiden crossing at an average speed of 29.6 knots.

The British reply to this German challenge was the building of the famous Cunarders *"Lusitania"* and *"Mauretania."* Steel of specially high tensile strength was used in the construction of these vessels, which had a gross tonnage of 28,830 and were larger than any previously built. The *"Lusitania"* was completed in 1907, and in October of that year achieved an eastbound record with an average speed of 23.61 knots. She surpassed this record on the westward passage, reaching a speed of 24.25 knots, and improved upon both speeds later. The *"Mauretania"* proved to be the faster of the two vessels, however, and she held the Blue Riband from 1909 to 1929, winning the honour with voyages at speeds of 26.06 and 25.89 knots respectively. The conversion of her furnaces to oil burning in 1921 increased her speed. This wonderful vessel reserved her greatest achievements for her old age, for in August 1929, when she was 22 years old, she made the voyage from New York to Eddystone Lightship in 4 days 17 hrs. 50 min., her average speed across the Atlantic being 27.22 knots. She then covered the distance from Eddystone to Cherbourg at an average of 29.7 knots, travelling at times at more than 30 knots.

Two months before the *"Mauretania's"* great feat, the Blue Riband had been wrested from her by the much larger German liner *"Bremen,"* which made her maiden voyage from Cherbourg to New York at an average speed of 27.83 knots, and achieved 27.91 knots on the return crossing. The appearance of this vessel heralded a period of intense rivalry in which four nations took part, for Italy and France also entered the conflict. The *"Bremen"* held her proud position only until 1934, when the honour passed to the Italian vessel *"Rex,"* of 51,062 tons, completed in 1932. Like the *"Bremen,"* she is fitted with geared turbines of very high power, and in 1933 she exceeded her designed speed of 27.5 knots by averaging 28.92 knots between Gibraltar and the Ambrose Lightship, New York.

The German and Italian record-breakers are all large vessels, equipped with powerful modern engines embodying the latest improvements in marine engineering; and their appearance in the North Atlantic service set new standards in luxury and speed, constituting a challenge that could not be ignored by Great Britain and France. In each country a giant liner nearly twice the size of the record holders was planned. The new ships were designed to provide the greatest comfort and luxury for passengers, and their engines were planned to give higher speeds, in spite of their enormous size.

The French vessel was the first to appear. She is a giant 1,029 ft. in length, with a tonnage of 83,442 and is therefore 114 ft. longer than the *"Majestic,"* the largest ship in the world prior to her appearance. She has the further distinction of being the first great liner on the transatlantic service to be fitted with turbo-electric machinery. The *"Normandie"* broke all records on her maiden voyage in June 1935. She covered the 3,192 miles from Southampton to the Ambrose Lightship in 4 days 11 hrs. and 42 mins., her average speed being 29.6 knots. From the Bishop Rock, in the Scilly Isles, the traditional starting point of the speed course across the Atlantic Ocean, her average speed actually was 29.98 knots.



The "Queen Mary," the first vessel to cross the Atlantic from the Ambrose Lightship to the Bishop Rock in under four days, and the present holder of the Blue Riband.

Thus at a single stroke the new French vessel surpassed the German and Italian vessels that had wrested the honour from the *"Mauretania."* She did not retain this proud distinction long, however, for in the following year *"Queen Mary,"* Britain's wonder liner, entered the service, and after a few voyages during which her engines were run in, reduced the time for a transatlantic voyage between Ambrose Lightship and the Bishop Rock to less than four days. Even on her maiden voyage *"Queen Mary"* had made a record by steaming 766 knots in a single day, and on the round voyage in August 1936, when she established a new standard of travel between Europe and America, she made the westward passage from the Bishop Rock to the Ambrose Lightship at 30.14 knots, and the return passage at 30.63 knots. An average speed of 30 knots had never previously been maintained on the westward voyage, and *"Queen Mary"* was the first ship to average more than 30 knots over an entire round voyage. Another Cunard White Star giant, larger and perhaps speedier than the *"Queen Mary,"* is now being built, and it seems likely that the Blue Riband will continue in British keeping for many years.

Machine that Strides to Work

The Bucyrus-Monighan Walking Dragline

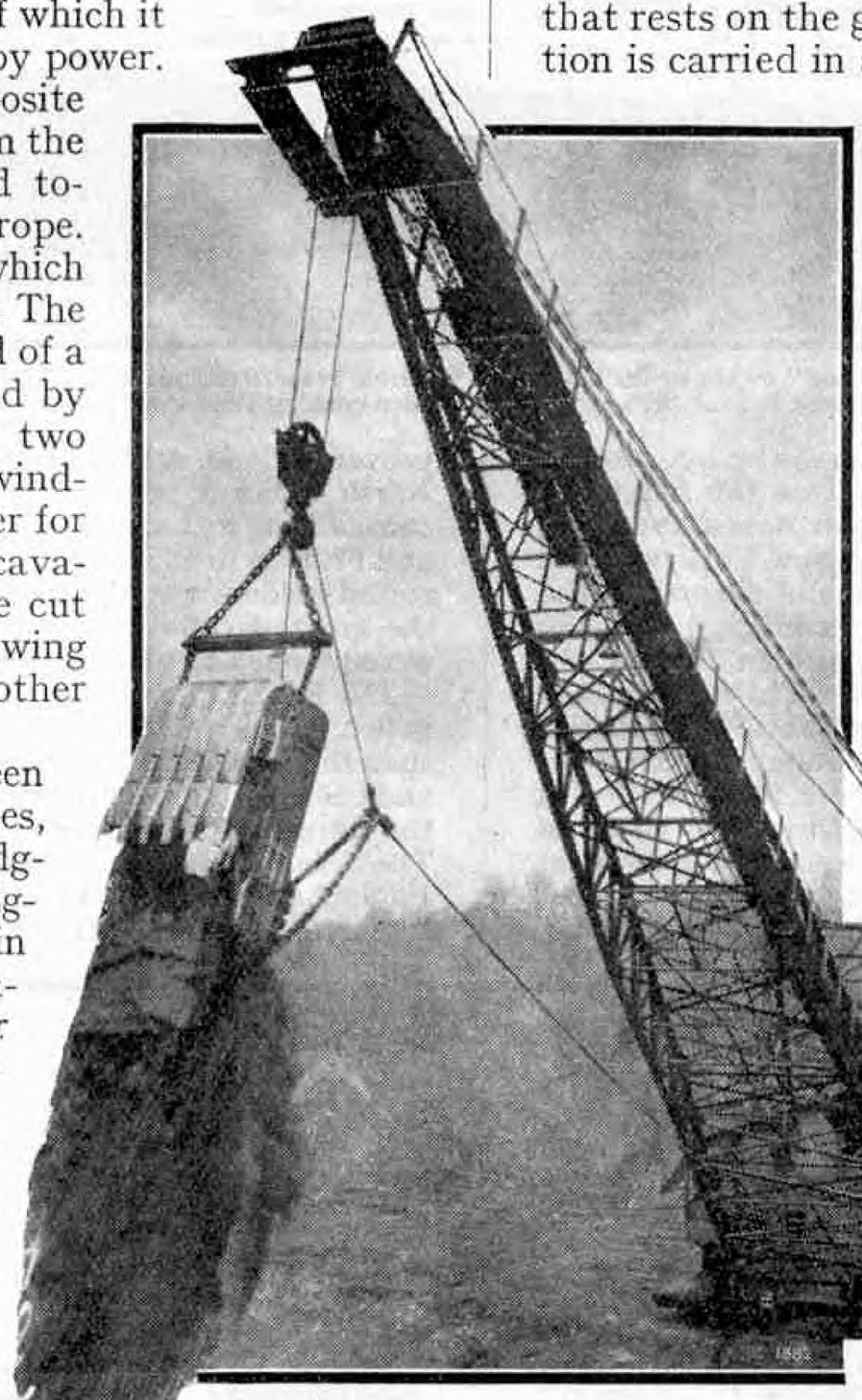
DRAGLINES are among the most interesting of the various types of machines employed for digging on a large scale. They are attractive because of their size, for draglines weighing 1,000 tons and more have been constructed, and also because of the remarkable manner in which they do their work. A mechanical shovel is pushed into the material to be removed, and lifts it out in the same manner as a hand shovel, of which it is simply a giant version driven by power. A dragline works in the opposite manner, and derives its name from the fact that the bucket is dragged towards the machine on a flexible rope. It excavates below the level on which it stands and travels backwards. The bucket is suspended from the end of a long boom or jib, and is operated by means of ropes passing over two drums, one of which is used for winding the digging rope and the other for lifting the bucket out of the excavation, regulating the depth of the cut and allowing the bucket to swing back for discharging and for another cut.

Dragline excavators have been brought into use for many purposes, especially for drainage and dredging, digging canals, and for digging out sand and gravel and in connection with the clay industries. They also are used for removing overburden, in opening up quarries and mines with the material to be worked near the surface, and for other work requiring long reach operation. For instance, railway cuttings can be excavated with their aid where reasonably soft ground has to be removed in large quantities. There are in fact few large civil engineering schemes in which dragline excavators cannot be employed.

Some draglines are designed to run on railway tracks laid down along the side of the ground over which their buckets work, although the majority move about on creeper tracks. During the last few years another form has come into prominence that actually walks about on two enormous "shoes" with slow and ponderous steps. This is the Bucyrus-Monighan Walking Dragline, and its peculiar walking traction device is its distinctive feature.

The movement of this dragline can be compared with that of a boy shuffling along while sitting astride a low music stool with his feet resting on the floor. If the boy wishes to face in a different direction he can revolve on the stool. When he wants to move into a new position, he can rest his feet on the ground and keep them still while lifting the stool beneath him and moving it a short distance forward or backward.

The walking dragline was designed primarily for the construction of levees, or river embankments, in the United States, and many are at work on the Mississippi, dragging mud from the shallow parts of the river and building up the banks with it. The machine is constructed on a revolving frame centred on a huge circular flat base that rests on the ground, and the machinery for its operation is carried in a large house built up on this revolving frame. The revolving frame and circular base are connected by a turntable and centre post. It is made in various sizes, and with buckets ranging from $1\frac{1}{2}$ cu. yd. to 12 cu. yd. in capacity.



A Bucyrus-Monighan Walking Dragline dumping a load taken up by its huge bucket. The photographs to this article are reproduced by courtesy of Ruston-Bucyrus Ltd., Lincoln.

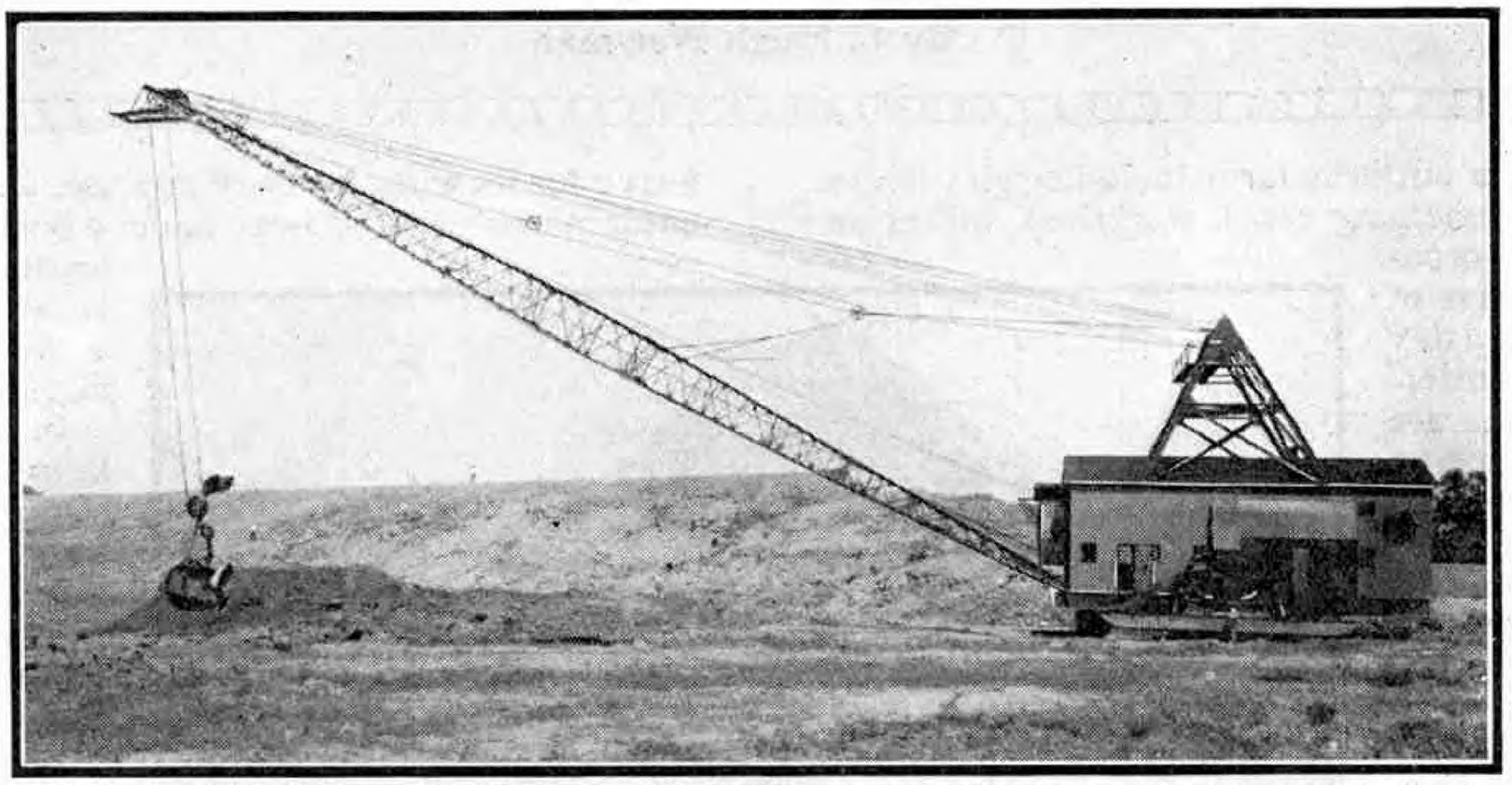
The device by means of which the machine walks is remarkably simple. On each side of the house is an immense shoe with bevelled ends. In size this shoe resembles a small barge, and it is shaped like a punt. When the machine is digging, the shoes are held high above the ground, the machine resting on its circular base. When the "walking" machinery is put into motion the shoes are simultaneously lowered by the action of cams, and most of the weight of the dragline is transferred to them from the circular base. The machine then tilts and is made to slide forward and be lowered gently, so that its entire weight is again resting on its base. The shoes are then raised to their highest position, at the same time moving forward ready for the next step.

The shoes are moved only in the opposite direction from that toward which the boom is pointing. The result is that the machine when travelling always appears to move backward with slow giant strides, and as it makes its way along it resembles some prehistoric monster in its ponderous movement. There is no steering mechanism, and to change its direction the dragline is simply swung round on its base until the boom points backwards from the desired direction of travel, the shoes of course being held up clear of the ground.

The mechanism that provides the walking movement is remarkably simple. A cross shaft driven by multiple reduction gear extends right through the cab, and at each end of it is an eccentric that revolves in an oval frame, to the lower side of which the shoe is fastened. As the eccentrics are turned the frames, and with them the shoes, are raised, moved forward and lowered to the ground. When the shoes touch the ground the action of the eccentric cams raises the circular base and slides it forward

to complete what may be described as a "step."

Rough ground and narrow ditches are taken by the dragline in its stride. Its adaptability is remarkable. It can follow a winding ditch and climb gradients up to about 1 in $3\frac{1}{2}$, and its immense shoes flatten out humps and span narrow ditches without difficulty. It can even walk on to a barge, and then easily makes its way to the place where its weight is evenly distributed.



At work on the construction of a levee on the banks of the Mississippi. The walking dragline was primarily designed for use in operations of this kind, as it can work on light or marshy ground.

The machine is supported upon its circular base when excavation is in progress. The area on which it rests is then so great that the bearing pressure upon the ground is only $6\frac{1}{2}$ lb. per sq. in., and upon this base the giant excavator works as steadily as a revolving crane. Its ability to operate satisfactorily on soft ground is a great advantage. Even if the earth is too wet and soft to enable the walking shoes to act satisfactorily, there is no difficulty in lifting these off the ground in order to place supporting material of some kind under them. In this respect the walking dragline has a great advantage over other types, in which the treads cannot be raised clear of the ground when caught in soft going.

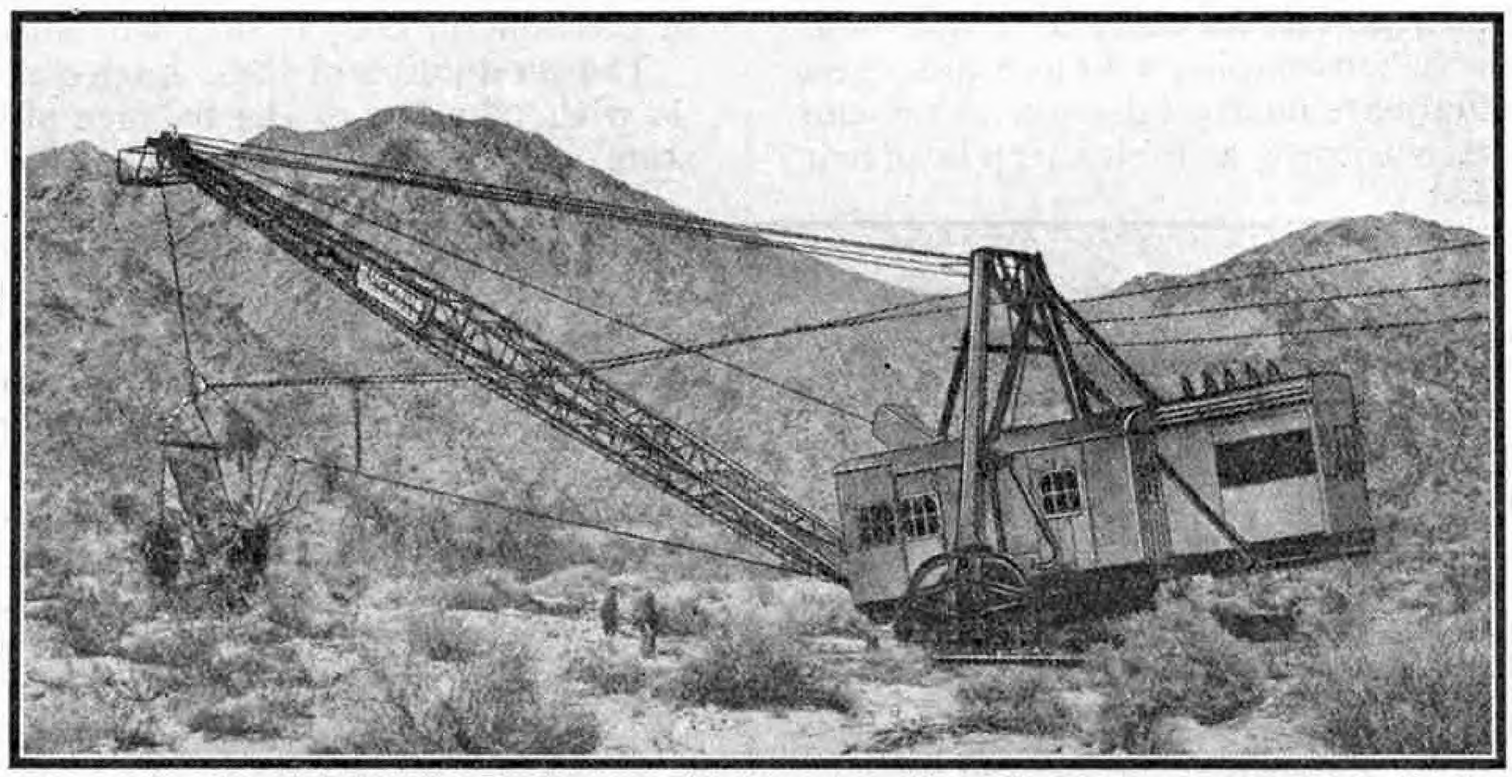
One of the outstanding features of the walking dragline is its rapid action. Every movement is easily controlled, and for ordinary working only two attendants are required, one to operate the machine and the other to keep the mechanism oiled. Power usually is obtained from a Diesel engine, but the smallest unit in the range can be driven by a petrol engine, and all can be adopted to the use of electric power, either supplied from an outside source through a trailing cable, or generated by an oil or petrol engine in the cab.

The smallest machine can be fitted with a boom 35 ft., 40 ft. or 50 ft. long, working with buckets of capacities from $1\frac{1}{2}$ cu. yd. for the shortest boom to $3\frac{1}{4}$ cu. yd. for the longest. The largest dragline is a giant machine with a boom that may be as much as 175 ft. in length, and the largest buckets it uses, with a boom of 140 ft., hold 12 cu. yd. of spoil.

The 5-W Walking Dragline is a typical machine of this type. Its working weight is nearly 140 tons, and with a boom of 80 ft. it is capable of excavation with a bucket of five cu. yd. or of six cu. yd. in the case of light material. Longer booms can be employed, but an increase in the reach of the machine carries with it a decrease in the quantity of the material scooped up. Thus buckets of 3 cu. yd. or $3\frac{1}{2}$ cu. yd. capacity only can be used with a boom of 100 ft. The booms of all the walking draglines are widely spread at their bases and taper towards their upper ends, as shown in the illustration on the opposite page, and they are strongly constructed in order to withstand the heavy strain put upon them. With the longest boom fitted, the greatest load allowed is nearly eight tons, but greater loads are permissible with the shorter booms.

The shoes on which this dragline walks are 25 ft. long and 4 ft. wide, so that they cover altogether 200 sq. ft. of ground. Every stride is 6 ft. in length and the machine can travel at the rate of 17 ft. in a minute. The great circular base on which it rests when at work is 24 ft. in diameter and the square structure turns on 40 rollers, each 10 in. in diameter, running in a circle measuring 18 ft. across.

The Diesel engine fitted as the power unit is of marine type, and has five cylinders. Its normal speed is 360 r.p.m., and it is rated at 250 h.p. Through transmission gearing it drives the drums of large diameter over which pass the ropes used for hoisting and for dragging the bucket through the material excavated. The shaft operating the walking shoes also is driven from the transmission gearing through a special clutch, and is held stationary when necessary by means of a large outside band brake. The superstructure is swung round by means of an electric motor of 40 h.p. This motor employs current at 230 volts derived from a special generator driven by the Diesel engine.



A Bucyrus-Monighan 5-W Walking Dragline engaged on the construction of the All-American Canal, in California. This illustration shows the dragline in motion.

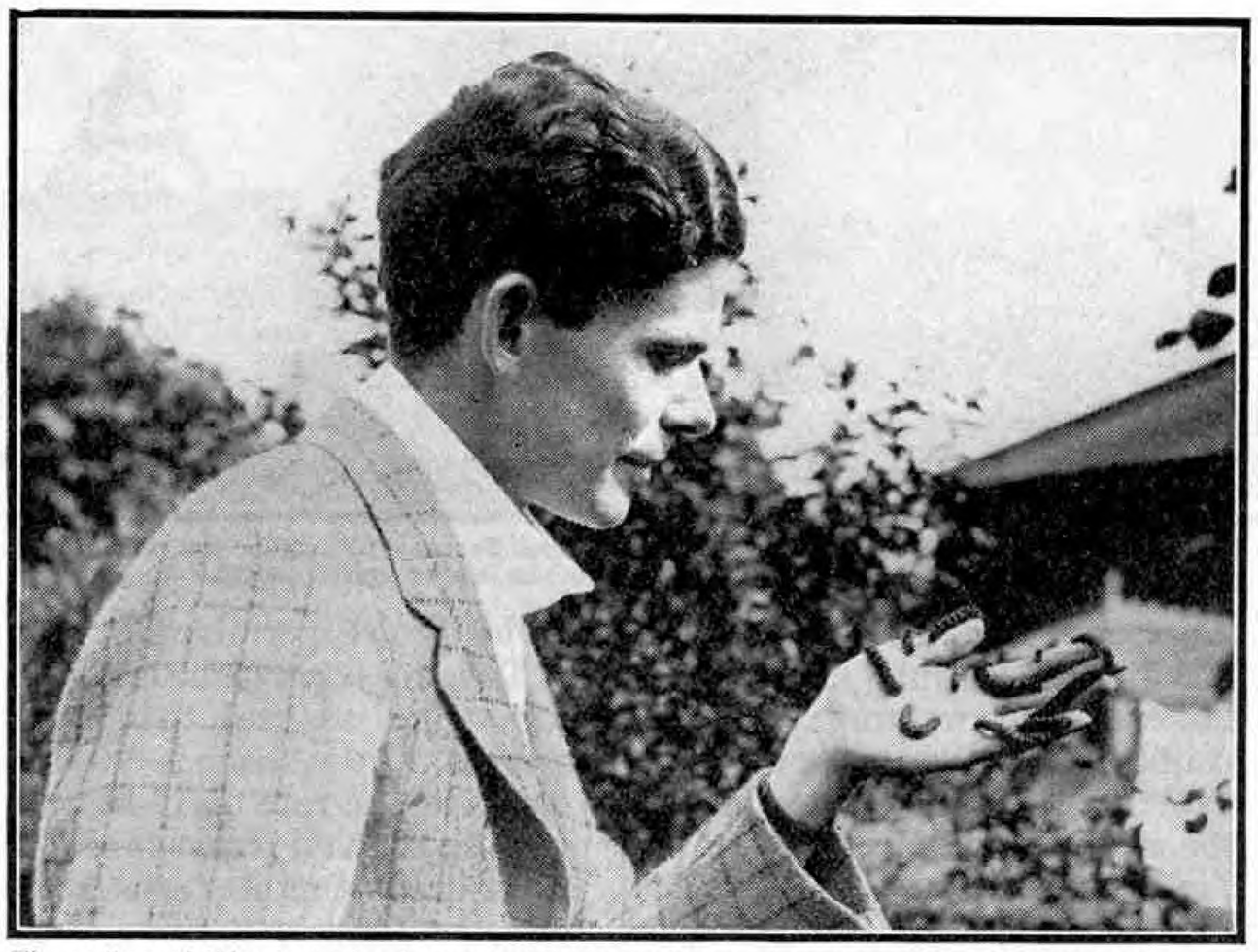
The operator in charge of the dragline sits well above the floor, with a good field of vision in all directions. He is able to work at full efficiency and without fatigue throughout a long shift, as the controls are easy to handle and are grouped conveniently round him. On his left is the switchboard for controlling the electrical current, and this is so designed that he cannot make connections wrongly.

The Daintiest Farm in the World

Breeding Butterflies by the Thousand

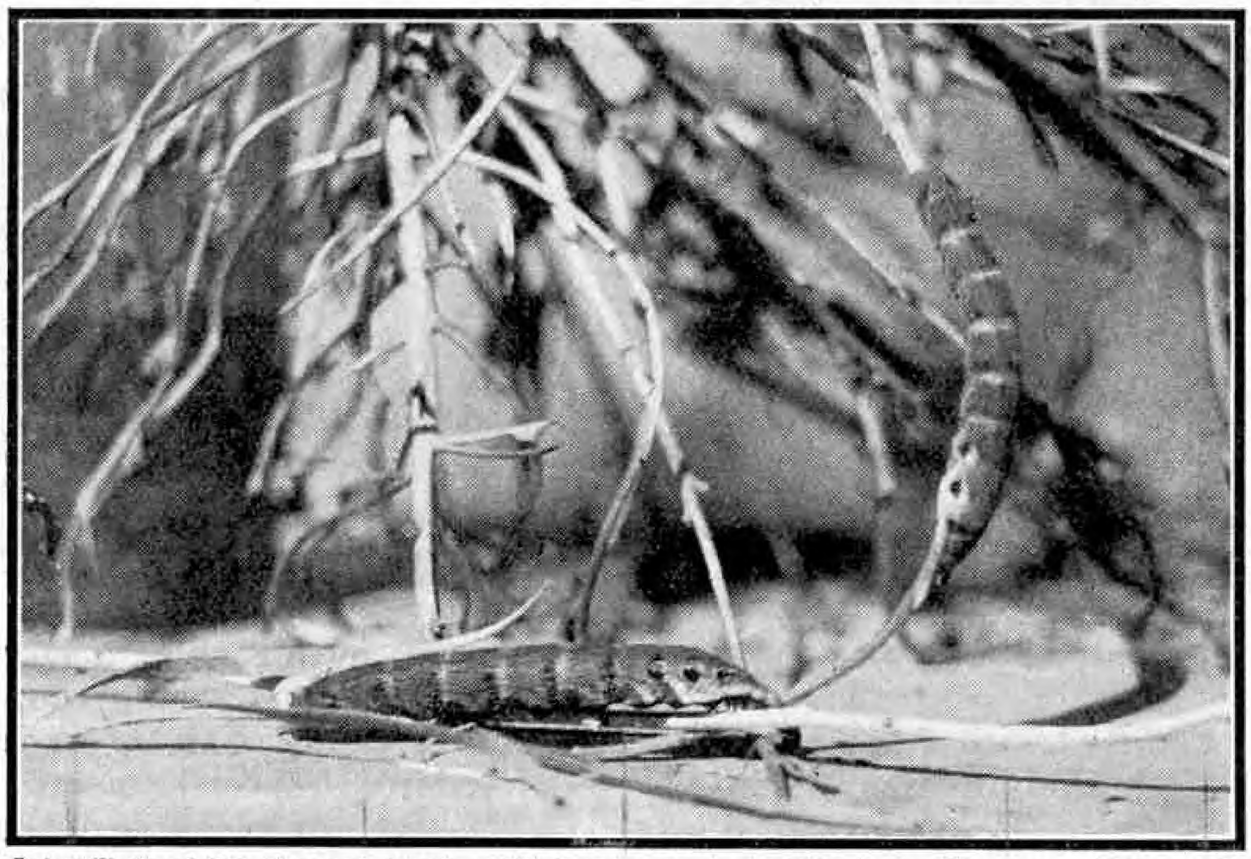
By L. Hugh Newman

THE whole of our butterfly farm, including glasshouses, breeding and emerging cases, workshop, offices and breeding grounds, occupies less than an acre of ground, and yet in a day one can see more butterflies in it than are normally met in a lifetime. Our breeding grounds are the gardener's nightmare, for although we grow almost every variety of tree and shrub, and large numbers of honey-bearing flowers, they are all literally alive with hundreds of different kinds of caterpillars.



The author of this story of a farm on which butterflies are reared examining a handful of Emperor moth caterpillars. These have been taken out of a "sleeve" for closer inspection.

Out of doors we keep most of our live-stock in what we call "sleeves." These are really large muslin bags that we put over a branch, or sometimes over a whole tree, to protect the caterpillars from their numerous enemies while they feed safely inside. Sometimes we put as many as a thousand lime hawks in a "sleeve" enveloping a 30-foot lime tree, and when the caterpillars are nearly full-grown they can be heard feeding a distance away, as their sharp jaws tear at the leaves in a most greedy manner. At night, anyone visiting the farm could imagine that they were having a nightmare, as these great balloon-like "sleeves" look like huge ghosts.



Caterpillars of the elephant hawk moth feeding on bay willow herb. The name of the moth is derived from the colour of the skins of the caterpillars, which resembles that of the elephant.

We keep our rarer butterflies and moths in greenhouses, for however careful one may be with insects, there are always enemies planning to capture them when they are in the open. Mice, rats, spiders, earwigs, woodlice and beetles consider our insects tasty morsels of food, and even a cat cannot leave a cage of fluttering butterflies alone for long. I remember once finding a robin at the bottom of one of our "sleeves." I suppose it had got in through a hole. It was so gorged with juicy caterpillars that its body was too heavy for its wings to be of any use, and when I lifted it out it merely crawled away under a bush. I thought it had learnt a lesson, and hoped it suffered from a bad attack of indigestion.

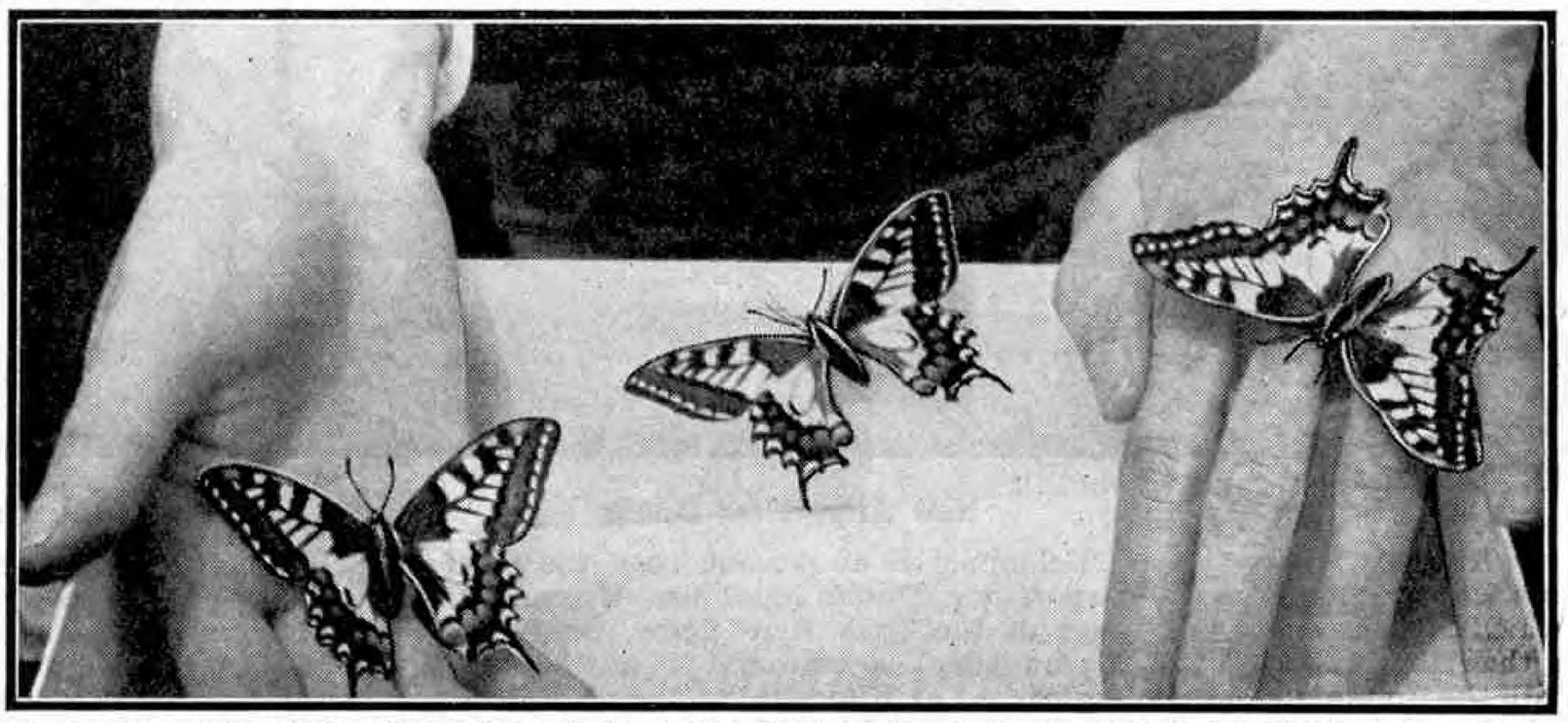
In our greenhouses we keep the caterpillars in cages rather like miniature rabbit hutches, which have glass fronts and sliding trays at the bottom to make them easier to clean them out.

It is one man's work during the busy season to get food for our queer family. Each species of caterpillar likes its own particular type of weed or shrub, and most of them are very fastidious and won't mix their diet. It is rather hard luck on the assistant we employ when we are breeding 10,000 peacocks, red admirals and tortoiseshells for the Insect House of the London Zoo, as they will eat only stinging nettles.

The production of these huge quantities is really all to do with "the law of the balance of nature." In the wild state only one or two per cent. of the eggs laid by a butterfly or moth ever reach maturity as the perfect insect. If this were not always the case we should be plagued with insects in a few years, and gardeners think conditions are bad enough as they are. If butterflies are bred in captivity, and protected from all their enemies, however, 100 per cent. usually can be reared.

Suppose we go out into the country in the spring and catch half a dozen peacock butterflies. We actually do this, armed with butterfly nets like those of the familiar old professors in cartoons and humorous stories. If the six butterflies we catch are females, they are capable of laying nearly 1,500 eggs between them, so that it is easy to work up a big stock of them. The females have

to be looked after very carefully if they are wanted to lay eggs, however. We usually put them into large cages out of doors, in which their natural food plant is growing, and where there are plenty of flowers for them to feed upon. The cages are stood in buckets of water mixed with insecticide, to stop the unwelcome calls of colonies of ants and other creeping marauders, and there the females can lay their eggs in perfect peace, amid very natural surroundings.



Tame swallow-tail butterflies feeding from the hand of the butterfly farmer who trains them. The farmer had previously dipped his hands in honey and water, which is eagerly taken up by the insects.

We supply caterpillars and butterflies in large quantities for many purposes. We have had some very strange orders within the last few years for scientific research, and experiments in connection with introducing fresh species into different parts of the world. Our largest order of this kind was for 50,000 cinnabar pupæ. These had to be exported to New Zealand, where it was hoped that the caterpillars would feed on the flower heads of the ragwort and stop the plant from seeding. Ragwort covers vast tracts of land in New Zealand, making it impossible to cultivate, and the Government thought that by introducing in sufficient quantity an insect that would feed upon it, they might alter the balance of nature and get rid of the pest.

One of the greatest enemies of the caterpillar is the ichneumon fly. The female fly usually adopts the same method of attack. She settles on the back of a caterpillar and punctures the skin with her long ovipositor, depositing an egg in the hole. A tiny grub soon hatches from this egg, and at once begins feeding on the internals of the unfortunate caterpillar. By wonderful instinct the grub always avoids the vital organs of its "host," which therefore remains alive until the grub is ready to pupate. Usually the unfortunate insect has a consumptive appearance, as you may well imagine, and his appetite is enormous. No butterfly or moth ever emerges from a chrysalis that has been "stung" by an ichneumon fly. Instead there appears only a swarm of tiny flies, or one large ugly travesty of what should have been a beautiful insect.

On our farm we usually manage to protect our stock from these parasites, as our cages are covered with close-mesh mosquito netting, but if there is a small hole or tear, an ichneumon fly is sure to find its way in.

Some of our cages are fitted with vita glass, and we have recently installed a modern heating apparatus in one of our greenhouses so that we can pit our brains against the "intelligence" of our butterflies, and make them believe in March that the sunny month of May has arrived, and it is time to lay their eggs.

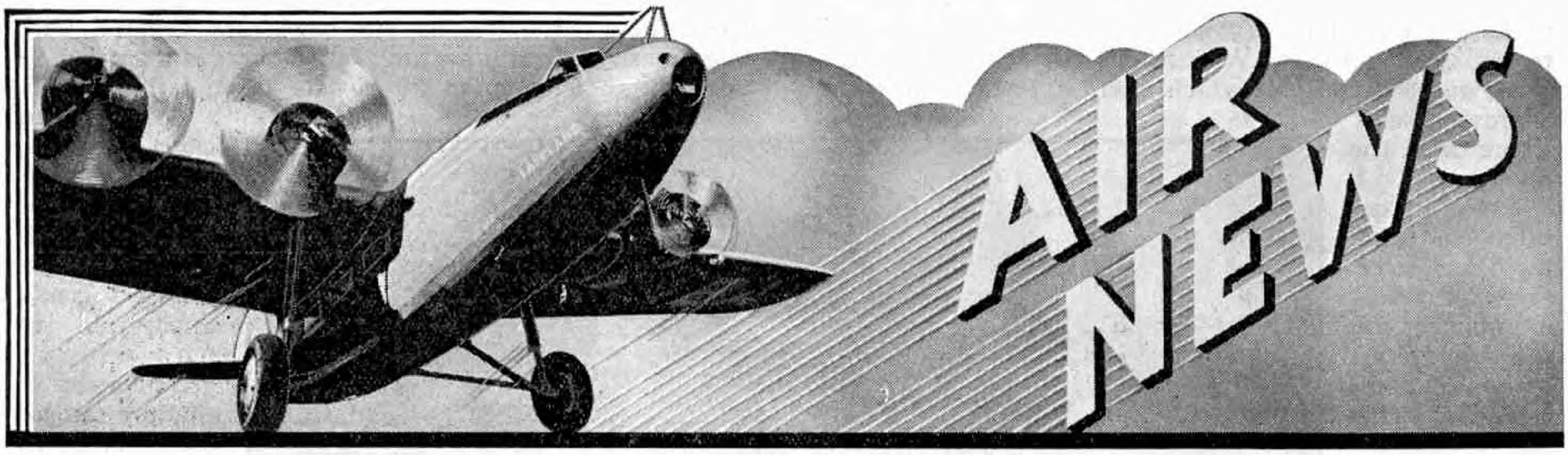
We have made some highly satisfactory experiments with artificial sunlight, and in some cases in the early spring we have saved valuable stock which would not feed unless the food plant were warmed by sunshine. Some species, such as the rare swallow-tail, we can feed forcibly by drawing out their tongues on to a pad of cotton wool soaked in honey and water. After a few days butterflies treated in this manner seem to learn to know their feeding time, for they unroll their tongues as soon as we put them on the wet pads.

Our busiest time is at the end of the summer season, as we breed thousands of hawk moths every year, and when they are full grown and ready to turn into pupæ they all want attending to at once. We fill dozens of large tea chests with earth and spread moss or dried leaves on the surface, and then, in the evening, we go round the "sleeves" and cages collecting the "semies." We call them "semies" as some of them are so impatient that they partially turn into chrysalides before we can put them into the boxes we have prepared. There we leave these big families until the following spring, when preparations have to be made for the great awakening, or emergence, as it is called by naturalists.



The fennel plantation of the butterfly farm where many thousands of the swallow-tail, Britain's rarest butterfly, are bred.

Young larvæ and eggs are sent out as well as butterflies and moths. The prices of the eggs vary considerably. Those of common species are 6d. per dozen, but 2/6 would have to be paid for a pine hawk moth egg, although it is not as large as a pin head. It is interesting also to know that a freak butterfly, with strange markings on its wings, may be worth as much as £20.



Preparing for North Atlantic Air Service

In preparation for the Imperial Airways North Atlantic air service, long-distance non-stop trial flights, which will include preliminary flights across the Atlantic Ocean, are being carried out with the Empire flying boats *"Caledonia"* and *"Cambria."* These machines differ from the other new flying boats already in service on the Empire air routes in being equipped with additional fuel tanks instead of the customary luxurious passenger accommodation.

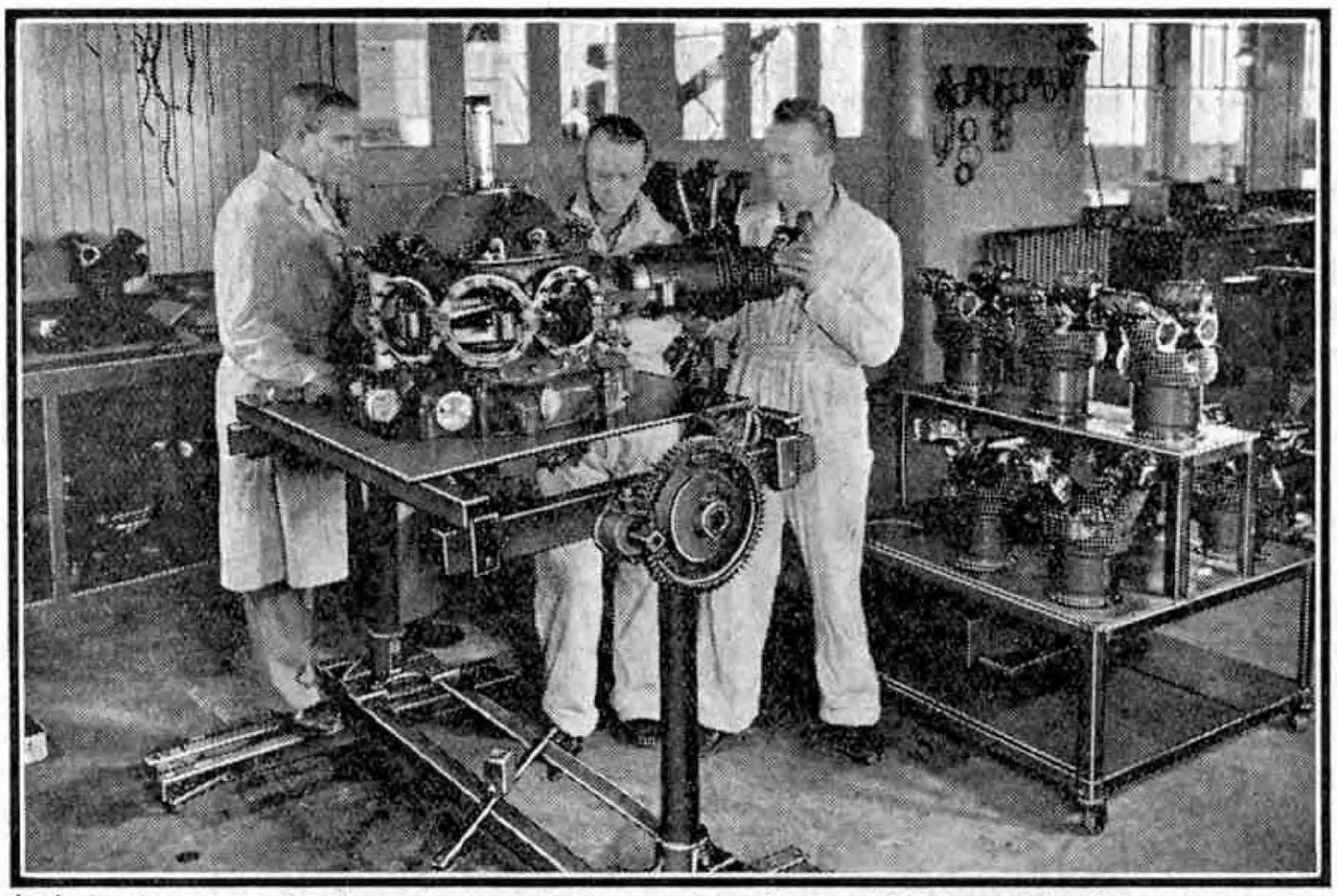
Two notable flights have been made by the *"Caledonia."* The first was a non-stop flight from Southampton to Alexandria, a distance of about 2,300 miles and considerably longer than that from Ireland to Newfoundland. A crew of five was carried, and the trip was accomplished at an average speed of 170 m.p.h. The return flight was made a fortnight later at an average speed of 150 m.p.h., severe head winds for about half the journey considerably reducing the speed of the machine. One of the purposes of these flights was to try out the *"Caledonia's"* short-wave radio installation, and the efficiency of this was demonstrated by the fact that the radio operators on another Empire flying boat, the *"Cassiopeia,"* then at Alexandria, were able to keep in touch with the *"Caledonia"* throughout the flight from Southampton to Alexandria.

"Cambria," the second long-distance flying boat, recently made a leisurely non-stop flight round Great Britain, covering a distance of about 1,300 miles at an average speed of 135 m.p.h. In this instance there was a crew of seven, which included officials of the Air Ministry and Marconi's Wireless Telegraph Co. Ltd. The pilot kept in constant touch with short-wave stations, including the new one at Foynes, on the Shannon estuary, that will play an important part in maintaining communication with machines engaged on the Atlantic service.

These three flights provided much valuable technical information in regard to the operation of the aircraft under actual service conditions and the maintenance of radio communication between the machines and ground stations.

New Airport for Dublin

Baldonnel is at present both the chief airport for Dublin and also the official base of the Irish Free State Air Force. A municipal aerodrome is now to be established at Kildonan, to the north-west of the city, where there is at present only a flying school. Kildonan was formerly an R.A.F. aerodrome. It is about 400 acres in extent, and an additional 100 acres of adjoining land have been purchased so that the aerodrome can be enlarged to meet the requirements of a commercial airport. The existing buildings will be re-constructed on modern lines, and when the new airport is ready, Baldonnel will be closed to civilian aircraft.



An instructor supervising the work of a student assembling a Pratt and Whitney "Wasp" aero engine after overhaul, at the Boeing School of Aeronautics, U.S.A.

More Danish Airports

Plans now in hand for the extensive development of internal air lines in Scandinavia include the construction of well-equipped airports at several important towns in Norway and Denmark. In Norway airports are being constructed near Stavanger and Trondheim, and at Fornebu. The Fornebu airport was begun in October 1934, and the preliminary work involved considerable rock blasting. It will serve Oslo, and will be the most up-to-date airport in Scandinavia.

In Denmark the Government Air Traffic Department recently sanctioned the erection of modern airports at Ronne, in the Isle of Bornholme, and near Esbjerg and Aalborg, in Jutland.

Speke Aircraft Factory

A large Government aircraft factory is being erected at Speke, near Liverpool, on land adjoining the airport. The erecting shops of this factory will cover a total area of about 12 acres, and will be among the largest in the country. The latest type of all-metal high-performance military monoplanes will be made at the factory. A carefully planned mass production system will be in operation. The raw materials will enter the shops at one end, and the finished aircraft, complete even to the engines, will pass out at the other. After being tested at the airport the aircraft will be flown direct to the particular R.A.F. stations to which they are assigned.

D.L.H. South Atlantic Service

The Deutsche Luft Hansa South Atlantic service, in which the ocean crossing is made by flying boats catapulted from depot ships, was inaugurated on 2nd February 1934. About 10,000,000 letters have been carried during the three years it has been in operation, and the 200th flight across the South Atlantic was made recently by one of the flying boats.

The total length of the route is about 9,500 miles. The termini are Frankfurt, Germany, and Santiago, Chile, and the time taken for the full trip is 4½ days. The overland portion of the service in Brazil is operated by the Brazilian Condor Syndicate, a company working in association with the Deutsche Luft Hansa.

Night-Flying Preparations on Imperial Airways' India Route

The equipping for regular night flying on the Karachi-Calcutta sections of the main Empire air route is making good progress. The latest type of automatic beacon has recently been installed at Daro-Naro in the Thar-Parker district. The operation of this beacon will be governed by a photo-electric device that will switch on the light when darkness falls and switch it off when daylight returns. Two complete sets of operating mechanism have been provided to guard against any accidental failure of the apparatus, and if one mechanism fails the other instantly comes into play.

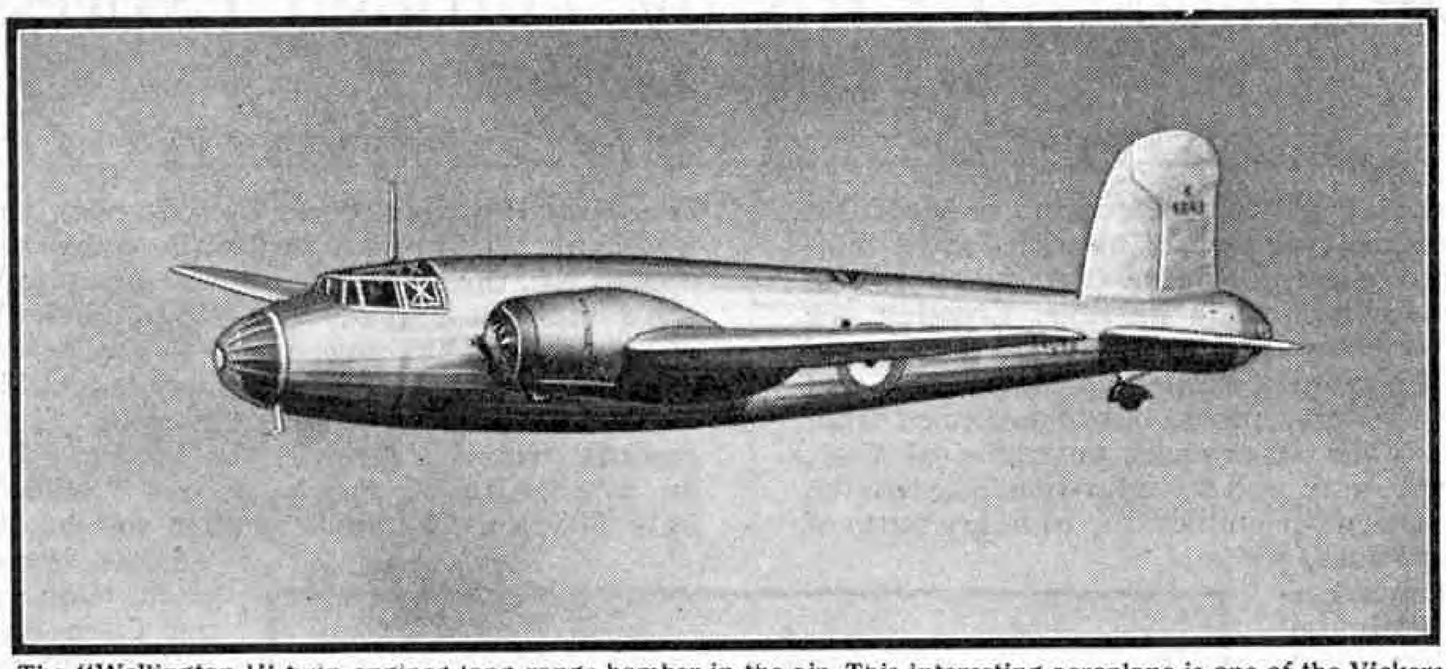
R.A.F. Vacancies for Apprentices

The expansion of the Royal Air Force continues to require the entry of large numbers of well-educated boys, and the Air Ministry announces that more than 1,500 will be admitted during the coming summer. About 1,250 of this total will be required in August for training as aircraft apprentices, and nearly 300 in September as boy entrants. No previous trade experience will be necessary. The trades in which aircraft apprentices are trained are some of the most highly skilled and highest paid in the Service, and a thorough training is given in them at a technical school, the course lasting three years. The trades concerned are fitter, fitter (armourer), wireless operator mechanic, and instrument maker.

Applicants for apprenticeships must be at least 15 but under 17 years of age on 1st August 1937, and a competitive examination for them will be conducted at numerous local centres on 1st June next, the subjects being Mathematics, English, General Knowledge and Science. The closing date for nominations for this examination is Tuesday, 4th May. Applicants possessing an approved first school certificate, with passes in Mathematics and a specified Science subject, may be excused the examination.

The trades open to boy entrants are also of great importance, and a sound training is given. In this case the trades are armourer, photographer, and wireless operator.

The period of service after attaining the age of 18 is 12 years for apprentices and 9 years for boy entrants. Further particulars of both apprenticeship and boy entrant schemes are given in Air Ministry pamphlets 15 and 54 respectively, and copies of these can be obtained from the Instructor of Recruiting, Royal Air Force, Victory House, Kingsway, London, W.C.2.



The "Wellington 1" twin-engined long-range bomber in the air. This interesting aeroplane is one of the Vickers types described on page 202. Photograph by courtesy of Vickers (Aviation) Ltd.

South African Air Force to be Increased

South Africa is to have a much larger Air Force, and the additions will include 100 military aircraft. The majority of the new machines will be Hawker "Harts," but various modifications will be effected to make them specially suitable for South African requirements. In their revised form the machines will be known as Hawker "Hartebeestes."

Another extension to the South African Air Force is to be the formation of a flight of British single-seater fighters, but the type of aircraft that will be adopted for this has not yet been made known.

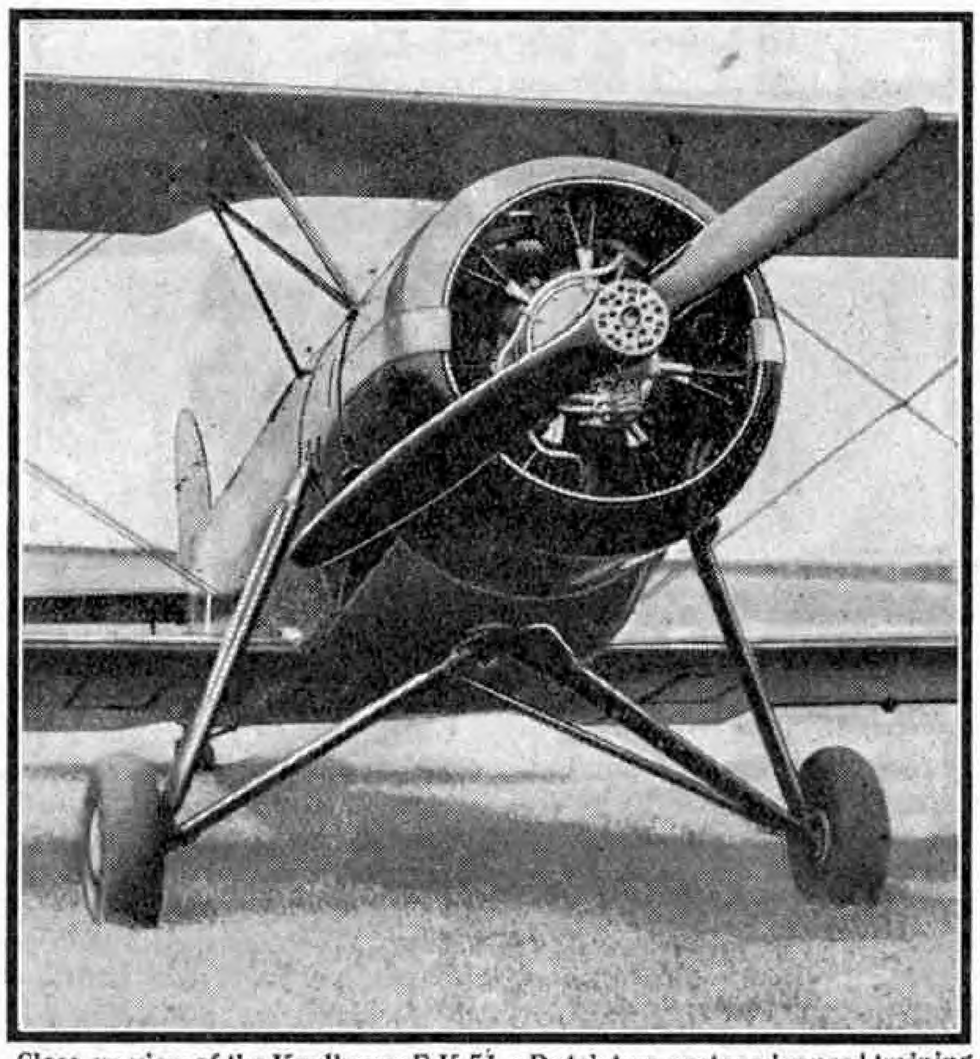
Proposed Canada-Australia Air Mail Service

Vancouver is being considered as the Canadian terminus of a proposed Canada-Australia air mail service. If the scheme progresses satisfactorily, test flights between the two countries probably will be carried out next year.

Air Transport in 1936

The annual reports for 1936 of some of the chief air transport companies of the world have recently been published, and show a continued steady increase in the volume of air traffic. Ala Littoria, the well-known Italian company, report that during last year their total receipts from passenger, freight and mail traffic reached £324,324, or no less than five times the receipts in 1935. The mileage flown was 5,302,000, compared with 3,571,000 the previous year.

American Air Lines, Inc. had a record year, and carried 254,600 passengers as against 176,005 in 1935, and the total distance flown by the company's aircraft was 14,829,000 miles, an increase of nearly one-third over the 1935 figure. The large fleet of aircraft owned by this company includes 34 Douglas machines, to which will soon be added 10 Douglas machines of the new D.C.3 type.



Close-up view of the Koolhoven F.K.51, a Dutch two-seater advanced training biplane. Photograph by courtesy of N.V. Koolhoven-Vliegtuigen, Rotterdam.

Record Flight Across U.S.A.

A new record for a flight across the United States has been set up by Howard Hughes, the American airman and film producer. He recently flew from Los Angeles to Newark, New Jersey, in 7 hr. 28 min., averaging 322 m.p.h.

Investigating Tropical Storms

At Havana a research staff is carrying out a special study of tropical storms in their relation to air navigation. In this work an instrument called a radio-meteorograph is secured to a pilotless balloon, which is then sent up to heights of from 10 to 15 miles. Details of temperature, air pressure, and humidity at various high altitudes are transmitted automatically by wireless from the instrument to ground receiving stations.

Junkers Aircraft for Portugal

The Portuguese Army Air Service have acquired 10 Junkers all-metal bombers. These triple-engined machines are a military version of the Ju.52 commercial air liner, and instead of passenger equipment they are equipped with machine guns and photographic apparatus. The bombers have a range of over 700 miles.

Air France Summer Schedule

The summer timetable of Air France comes into force on the 4th of this month, and as usual there are several changes from previous summer schedules. There are to be two new services, an afternoon one direct from London to Geneva in which the trip will take only 3¾ hrs., and a Paris-Toulouse service flown by way of Bordeaux. The latter service, in conjunction with the weekly one via Dakar, will enable passengers for Nigeria and the Gold Coast to travel the whole way by air, instead of having to make part of the French section of the journey by train.

The introduction of the new Potez aircraft purchased last year has satisfactorily speeded up the schedule of the company's Far Eastern air line. The machines are being employed on the Damascus-Hanoi section.

Southampton as Empire Air Service Base

An important change brought about by the introduction of the new flying boats on the European section of the Empire air routes has been the transfer of the English terminus of the routes from Croydon to Southampton. The outward-bound flying boats for Central and Southern Africa, and the machines inward bound from India, Hong Kong, Malaya and Australia now use the temporary air base at Hythe, near Southampton. This base will be used until the completion of the Empire Airport that is to be constructed at Langstone Harbour, Plymouth.

Sweden Buys Aircraft by Barter

The equipment of the Swedish Air Force is to be increased by the purchase of 36 Junkers Ju.86 bombers. The makers are not supplying the engines for the machines, and the latter will be paid for in Swedish agricultural and industrial products instead of in cash.

The Dover—Dunkerque Train Ferry

II.—London to Paris by Through Express

By a Railway Engineer

IN last month's "*M.M.*" I described the construction of the Train Ferry dock at Dover, an engineering feat of unprecedented difficulty, and now I come to the splendid service that the successful completion of the dock works has made possible. Crossing the Channel by a through express train is a novel and fascinating experience, the interest of which is not confined to the loading and unloading of the coaches at the ferry ports, but is sustained from start to finish; the service is an experiment in transport that, judging by its great popularity, may well have far-reaching results. There are already good connections at Dunkerque to many parts of Europe, and the time is surely not far off when there will be through carriages from London to Belgium, Switzerland, and even farther afield.

As my taxi threaded its way through the West End of London the very fact that I was going abroad made me look at things more intently than usual. Theatreland, despite the glitter and gaiety, seemed just as downrightly English as the Mall, which was lined with stands ready for the Coronation. Even the courtyard at Victoria gave not the slightest suggestion of the surprise within the station, but once inside, the Continental platform presented a sight rare and strange indeed for an English railway. Here the Paris express was drawn up, four huge cars in the Royal blue livery of the International Sleeping Car Company. Blinds drawn aside revealed the brilliant saxe-blue of the berth interiors, and the chocolate-uniformed attendants, receiving patrons, gesticulating, brought a vivid foreign atmosphere to the station.

In addition to the sleeping cars the train carries a portion for ordinary passengers, which is detached at Dover, and a number of vans containing registered luggage. The sleepers are, with one exception, the heaviest passenger vehicles running on British metals, and weigh no less than 55 tons apiece. On my trip the gross load on leaving London was 440 tons behind the tender. With green Southern Railway coaches, chocolate and cream Pullmans, and the blue sleeping cars, the train had quite a harlequin appearance; while the engine, four cylinder 4–6–0 No. 854, "*Howard of Effingham*," in both name and outline brought a slice of solid English to add to the general cosmopolitanism.

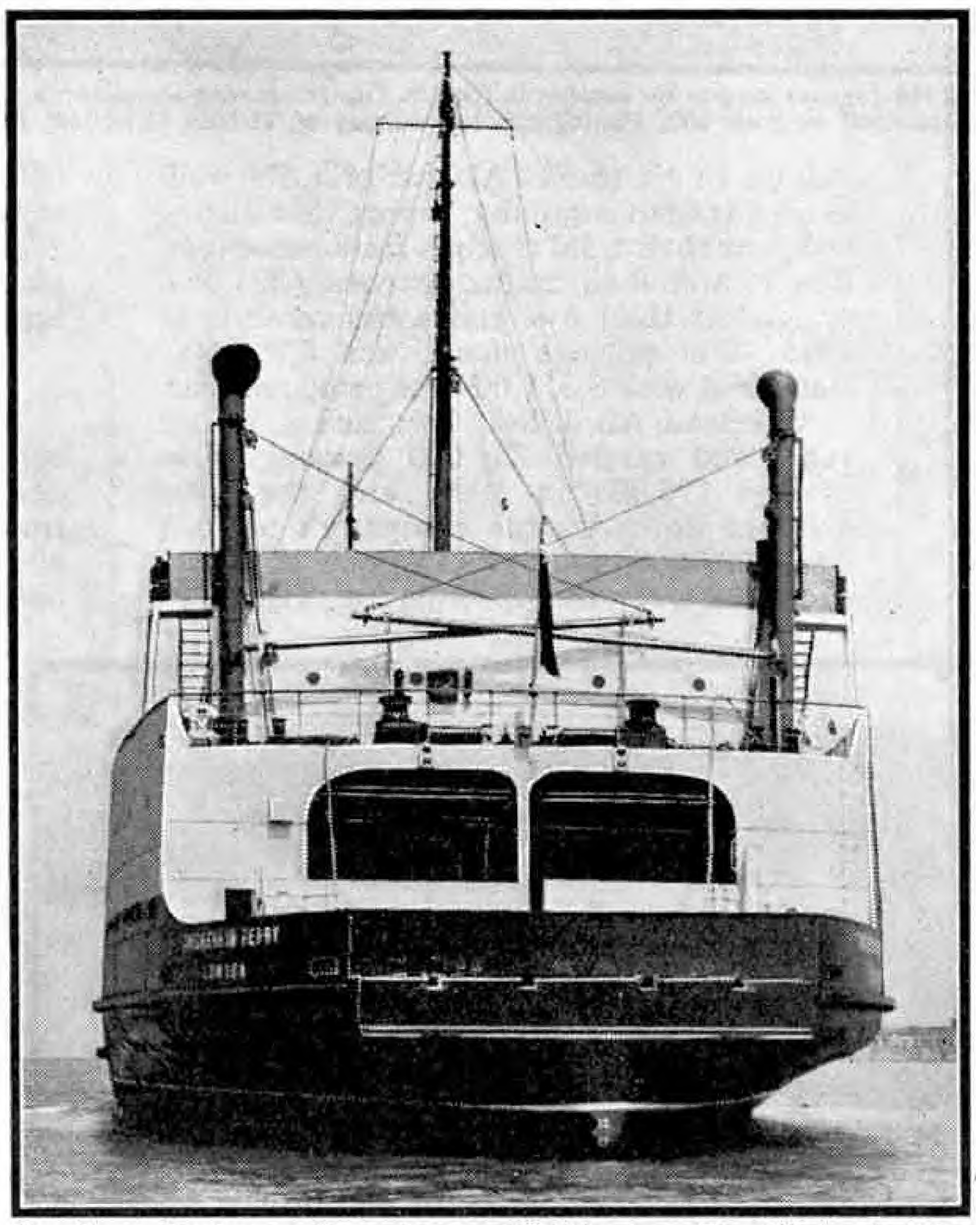
Ten p.m. brought farewells in many languages; a German businessman, an English playwright, and another whose speech was strange to me lined the corridor. The dynamic little French steward was here, there, and everywhere, settling all questions, going from berth to berth in lightning succession making everyone comfortable. This is indeed a train for men of affairs. In the restaurant car scraps of conversation that one overhears bring mining in France, sport in Hungary and the commerce of the Baltic within the confines of a single railway carriage.

In the meantime "*Howard of Effingham*" was speeding these distinguished parting guests with a really superb example of British locomotive work. In the early stages the run promised well, but then came two signal checks each bringing us down almost to walking pace, and making our time for the 31½ miles out to Tonbridge as much as 49½ minutes. This was followed by a long slowing to 15 m.p.h. for permanent way work beyond Paddock Wood, and it was after we had mounted the rise past Marden that the record-breaking effort began.

Speed first of all rose to 69 on the level near Headcorn, and then the long rise to Chart siding, mostly at 1 in 270–300, was climbed at a minimum speed of 66 m.p.h., with a rapid rise to 72 in the slight dip that comes half way up, through Pluckley station. Touching 75 through Ashford—going east!—we then averaged 68.4 m.p.h. throughout the 8-mile ascent to Westenhanger, breasting the summit at a steady 61½ m.p.h. on the 1 in 286 grade. "*Howard of Effingham*" thus covered the 20.2 miles from Headcorn to Sandling Junction in 17¾ minutes, an average of all but 69 m.p.h. over a section almost entirely against the collar. This is an absolute record of records over this stretch; the fastest I have ever done before is an average of 63 m.p.h. with a "Schools" class 4–4–0 hauling only 305 tons, a much smaller weight than our present load.

I had become so absorbed in this grand running that, for the moment, the Train Ferry was completely forgotten; but as we ran down through Shorncliffe, now doing 77 m.p.h., a fellow traveller announced that he was going to bed. I switched off the lights of my berth to get a better view of the Channel as we passed through Folkestone Warren, and there over the sea the French lighthouses were making brilliant play. Threading our way through the long tunnels in the chalk we steamed into Dover Marine station in 99¾ minutes from Victoria. "*Howard of Effingham*" had in this short distance regained over six minutes of lost time and we were only 3¾ minutes late.

We had scarcely stopped before a local tank engine was attached in rear, and soon the cross-Channel portion was being drawn out round the eastern spur of the triangle to Hawkesbury St. Junction. In the dock, amid a blaze of quayside lights, lay the "*Twickenham Ferry*." Behind her the lights of Dover twinkled up the steep hillside to the Castle, and farther away the South Foreland lighthouse was sweeping the sky with a huge fan-shaped beam of light. The little engine backed us down towards the ship, green lights shone ahead, and then the heavy sleeping cars passed smoothly and quietly over the connecting bridge on to the vessel.



The Dover-Dunkerque ferry steamer "Twickenham Ferry," showing the entrance arch on the train deck. This and the upper illustration on the next page are reproduced by courtesy of the Southern Railway.

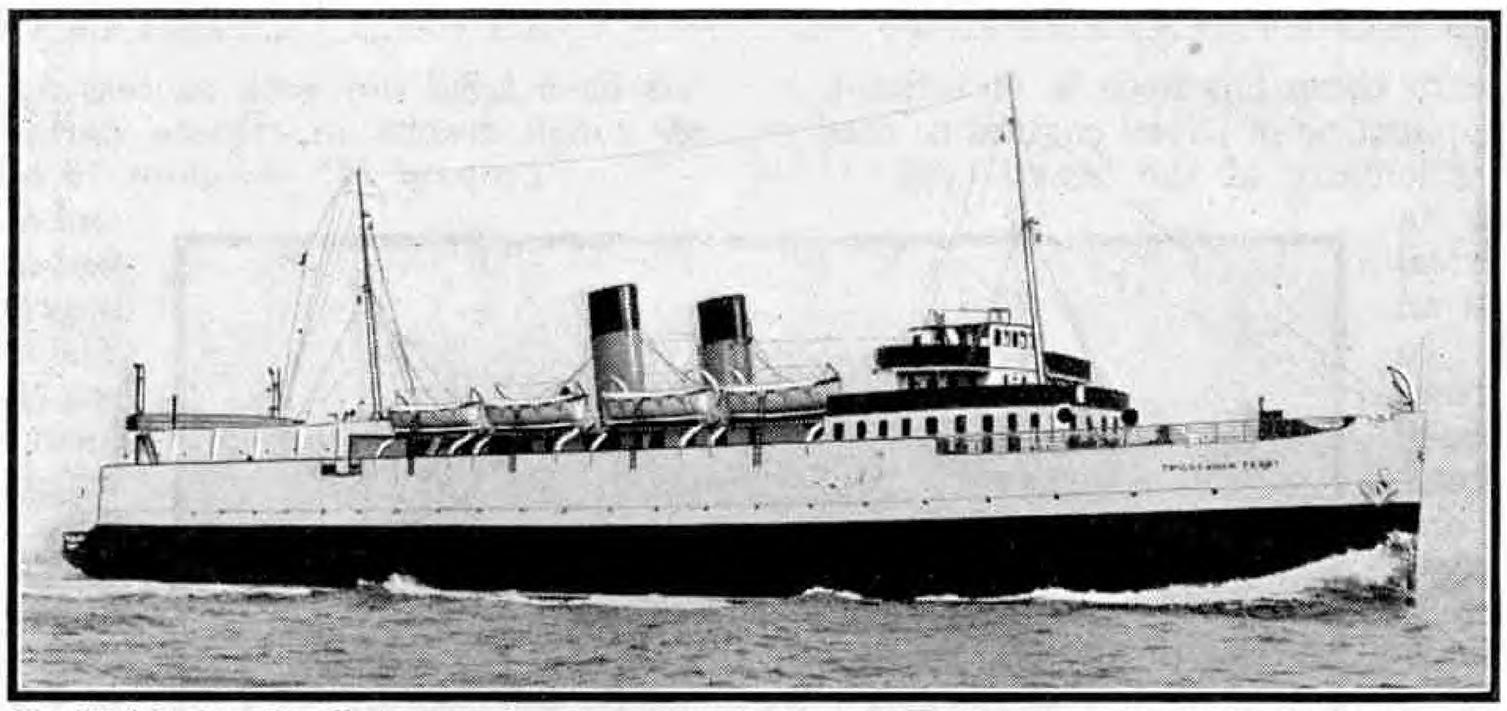
Although the train deck of the ship is approximately level with the quayside during loading operations, there is bound to be a certain amount of tilting, both sideways and longitudinally, as the train is pushed on board. The connecting bridge, which is 70 ft. long, is articulated so as to accommodate this movement, but no little skill and good judgment is needed on the part of the officer in charge in order to carry out this manœuvre with the very minimum of tilting. As we came to the bridge, I waited keenly to see how much tilting motion could be felt as the coaches passed on board. Standing in the corridor and watching the whole operation I was, perhaps not in the best position to sense any movement of that kind, but certainly I felt not the slightest tilting action.

Once on to the ship I got out of the sleeping car to watch the rest of the proceedings. During the voyage the cars are secured to the deck of the ferry. Powerful jacks are used to take all the weight off the springs and chains attached to the main frames of the coaches to anchor them to the deck. Every care is taken to ensure that passengers' rest is not disturbed: the men securing the cars moved about almost noiselessly, and the chains themselves are bound with rope so as to deaden the noise should one be accidentally dropped. In the meantime the luggage vans were being shunted on to an adjacent track, equally quietly. From a stern view of one of the ships it is not readily apparent that there are four tracks, but actually the diverging points come just inside the entrance; on this particular night quite a lot of through goods traffic was being taken across in addition to the London-Paris express.

The ferries are notable ships. From the narrow platforms on the

train deck staircases lead up to the promenade deck where there are comfortable lounges, an excellent restaurant, and all the other amenities of a modern cross-Channel boat; but the most distinctive external feature is the placing of the funnels abreast of each other. Great ingenuity was displayed in arranging the boiler uptakes, for practically the whole width of the ship down below is taken up by train space, and this restriction accounts for the extreme narrowness of the funnels. The ferries are driven by geared turbines of the ordinary Parsons type, supplied with steam by Yarrow water-tube boilers.

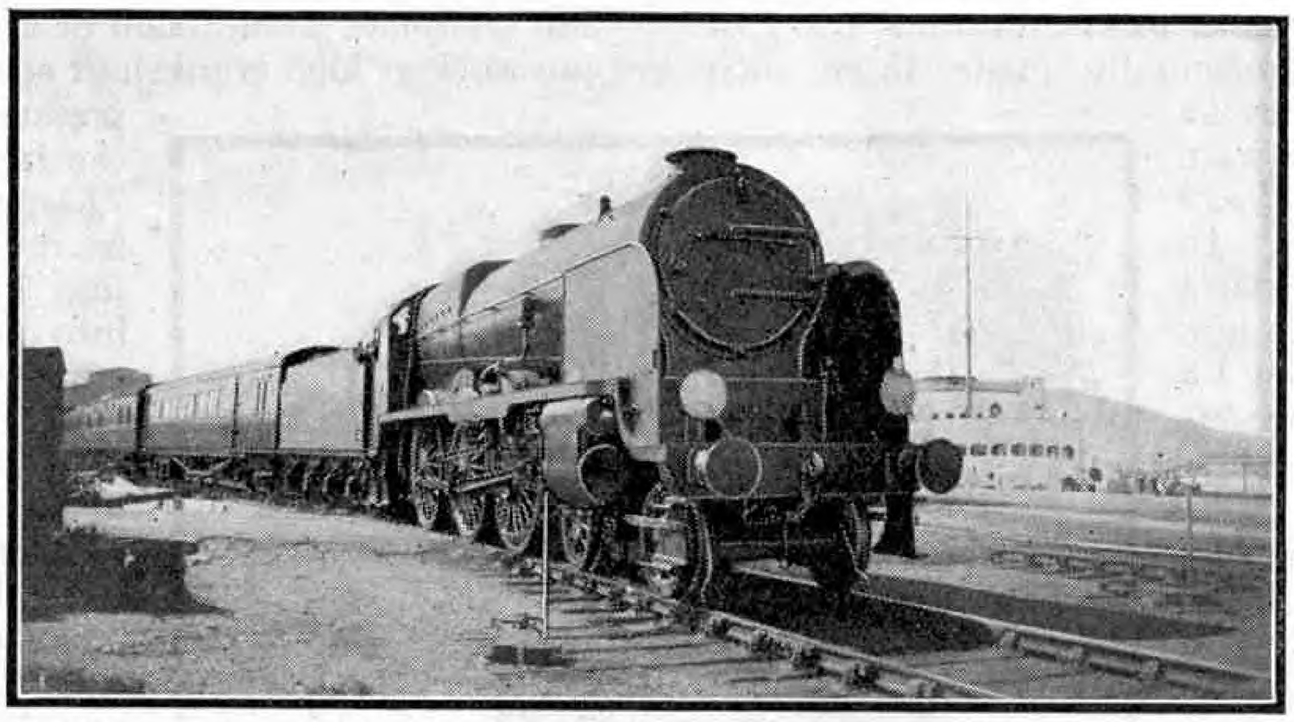
On the upper deck abaft the passenger accommodation is a spacious garage for cars. Up to now, however, the full benefits of the train ferry service have not been available to motorists as the buildings on the dock side at Dover are not complete. An inclined ramp is under construction that eventually will permit of cars being driven straight on to the deck of the ship and into the garage.



The "Twickenham Ferry" at sea; the funnels are situated at each side of the ship in order to allow for the presence of the tracks on the train deck.

By now the connecting bridge was hoisted up high and clear of the ship's stern, telegraph signals were ringing in the pump house, and the water in the dock showed some sign of movement. The lights on the navigating bridge were extinguished and all was ready for us to start. The *"Twickenham Ferry,"* although designed and built in England, is operated by the French company Soc. Anon de Navigation Angleterre-Lorraine-Alsace, and it was a little strange at first to hear orders from the bridge coming in a foreign language; the sailors, all wearing red-bobbed tam o' shanters, moved about with great agility. Then the inner lock gate began to swing downward, stealthily, in dead silence; there was something awe-inspiring about the way in which it slowly disappeared beneath the water. More calls, and buzzers going in the pump house, and then the other gate began to move outward. Donkey engines started, chains began to grate, and we were off, on the stroke of 12.35 a.m.

As we steamed out, Dover harbour was a beautiful spectacle. The Southern Railway luxury ship *"Canterbury,"* and the handsome Belgian steamer *"Prince Leopold,"* were berthed alongside the Marine station; the harbour lights were flashing, and out beyond the breakwaters were the lights of passing ships. It was a fine, still night, a rarity indeed in this winter of storms, and as we crossed the bar the *"Twickenham Ferry"* took up only the faintest rolling. Amid the revolving beams of the lighthouses it was just like putting out to sea under a battery of searchlights. The Channel seemed alive with shipping; I counted the navigation lights of 16 vessels, and before we were very far out the yellow beams of the South and East Goodwin lightships were added to the brilliant display. Shortly after 1 a.m., with the *"Twickenham Ferry"* making a good 15 knots, I went down to bed—in the train!



S.R. "Nelson" class locomotive No. 858, "Lord Duncan," at Dover. This is of the same class as "Howard of Effingham," the engine concerned in the journey described in this article.

The feeling was a little queer at first; one could just feel the movement of the waves, but all the usual noises of a ship were entirely absent. I was soon fast asleep.

* * * * *

Several hours later I was awakened by some slight noise. I had intended to rouse myself fully and listen to the unloading of the train from the ferry at Dunkerque, but the operation was done so quietly that I very nearly slept through it. This dock working is a remarkable achievement. At Dover I had watched the multifarious activities connected with the loading of the train; at Dunkerque these were all carried out, in the reverse order, and, to one lying in a sleeping berth, in almost complete silence.

It was after six when I roused again, and then it was to see a crimson sunrise over the level plains of Flanders. The "sleeper" travelled as smoothly as one could wish for, without the slightest oscillation. We passed slowly through Arras, and then after Albert was left behind I got up. Shaving in the train can often be a hazardous business, but not so on this service; our Super-Pacific was now speeding along at 75 m.p.h. and yet my toilet was performed just as easily and comfortably as at home.

The route followed runs parallel to, but some distance east of, the Nord main line from Paris to the Channel ports; but after Arras is passed it swings south-west and joins the main line at Longueau, just south of Amiens. The load was not so heavy now as on the English side, for to the sleepers and the through vans only two coaches had been added at Dunkerque; with passengers and luggage the train weighed 385 tons. Our engine was No. 3-1244, one of the earlier batch of Super-Pacifics, built shortly after the War. She was getting along in great style and doing 55 to 65 all the way up the ascent to Gannes.

Shortly after we had passed Longueau the cheery little steward arrived with coffee and rolls. During the night he had attended to all questions of tickets and passports, and on arrival in Paris all that remained to be done was to get out of the train! The French customs officials came along shortly after we had passed Gannes, and went quietly from berth to berth.

Meanwhile we were speeding towards Paris at a steady 70 to 72 m.p.h. The Picardy landscape has a charm all its own, and under this morning's grey skies the white hedgeless roads winding like ribbons across great expanses of newly-ploughed fields, leafless copses gently stirring in the wind, villages of quaint houses, with their shuttered windows and red-tiled roofs, made up a swiftly passing scene of quiet and delicate beauty. But now we were slowing down for the only stop between Dunkerque and Paris, a brief halt of but 20 seconds at Creil to allow the passport officer to join the train.

We had left Dunkerque on time, at 5.29 a.m. and the 158½ miles had taken just 170 minutes, a fine run in view of the numerous slacks enforced north of Arras; we had 35 minutes left to cover the remaining 31¼ miles into Paris. Now, in conclusion, we were treated to a splendid piece of French locomotive work. From Creil the line rises at 1 in 200 continuously for nearly 14 miles, but up this grade No. 3-1244 gradually worked up to a sustained 60 m.p.h., through the Forest of Chantilly. Speed fell off when nearing the summit, but still we did not go below 57; this feat makes an interesting comparison with *"Howard of Effingham's"* performance on the ascent to Westenhanger earlier in the run.

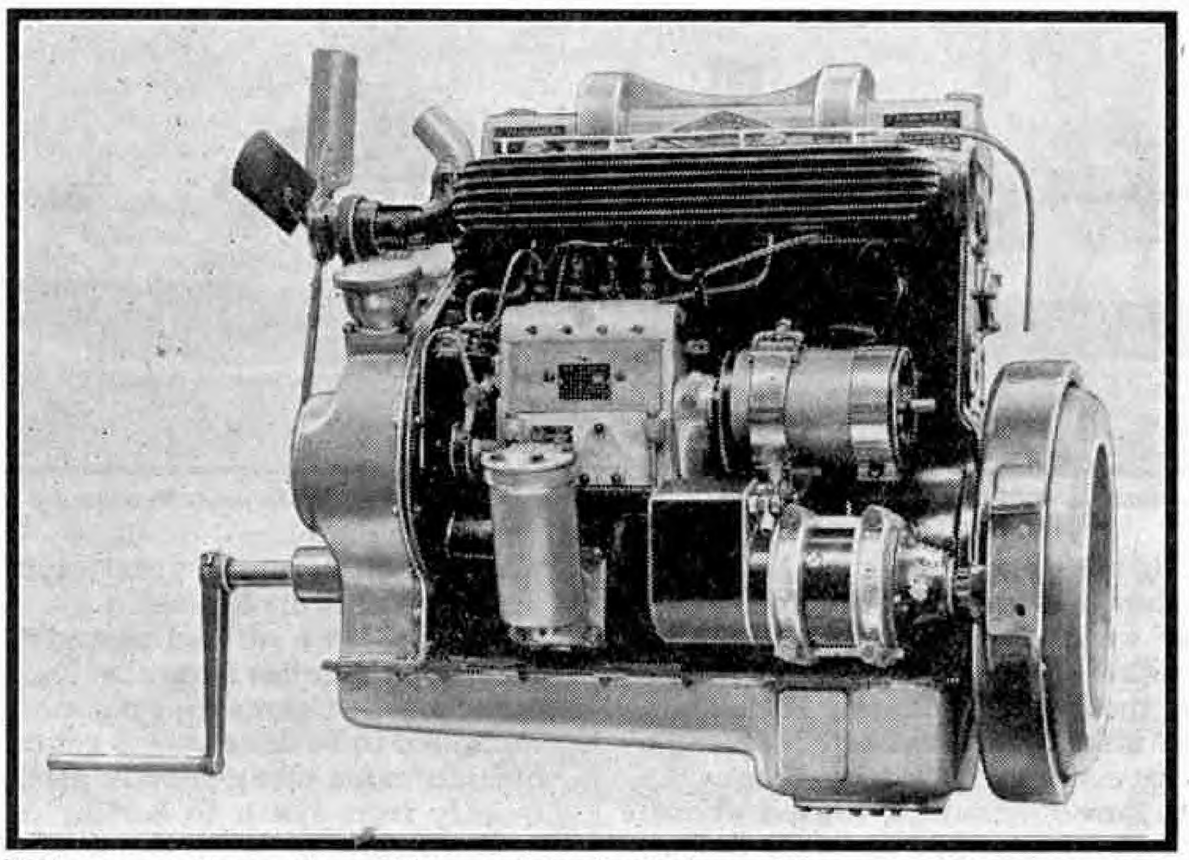
After passing the summit at Survilliers No. 3-1244 bowled down towards Paris at a steady 76 m.p.h.; we were through St. Denis, 27½ miles from Creil, in 28 minutes, and were in good trim for an arrival several minutes early. Sweeping through a maze of flying junctions, past huge marshalling yards, we were then severely checked by signals when almost abreast of La Chapelle engine sheds; but after glimpses of splendid Nord locomotives being got ready for the road, and then the hill of Montmartre crowned by the exquisite mosque-like church of La Sacré Cœur, we steamed into the Gare du Nord dead on time—a fitting end to a most enjoyable trip.

Diesel Engines for Road Vehicles

The Perkins *"Leopard II"* Power Unit

DURING recent years there has been a remarkable extension in the application of Diesel engines to road transport vehicles, particularly of the heavy type. In Germany about one in every three commercial vehicles is fitted with an engine of this kind. In Great Britain the oil engine has not yet been adopted to such an extent, but many lorries and omnibuses are now driven by heavy oil power units instead of the more familiar petrol engine.

In its early days the Diesel engine was much heavier than one of corresponding power using petrol. This retarded its progress for some time, but improvements in design and the use of new and lighter alloys for constructional purposes resulted in considerable reductions in weight, and powerful oil engines light enough to be used in aircraft are now made in many types and sizes.



High power and low engine weight are outstanding features of the new Perkins "Leopard II" oil engine shown above. For the illustrations on this page we are indebted to F. Perkins Ltd.

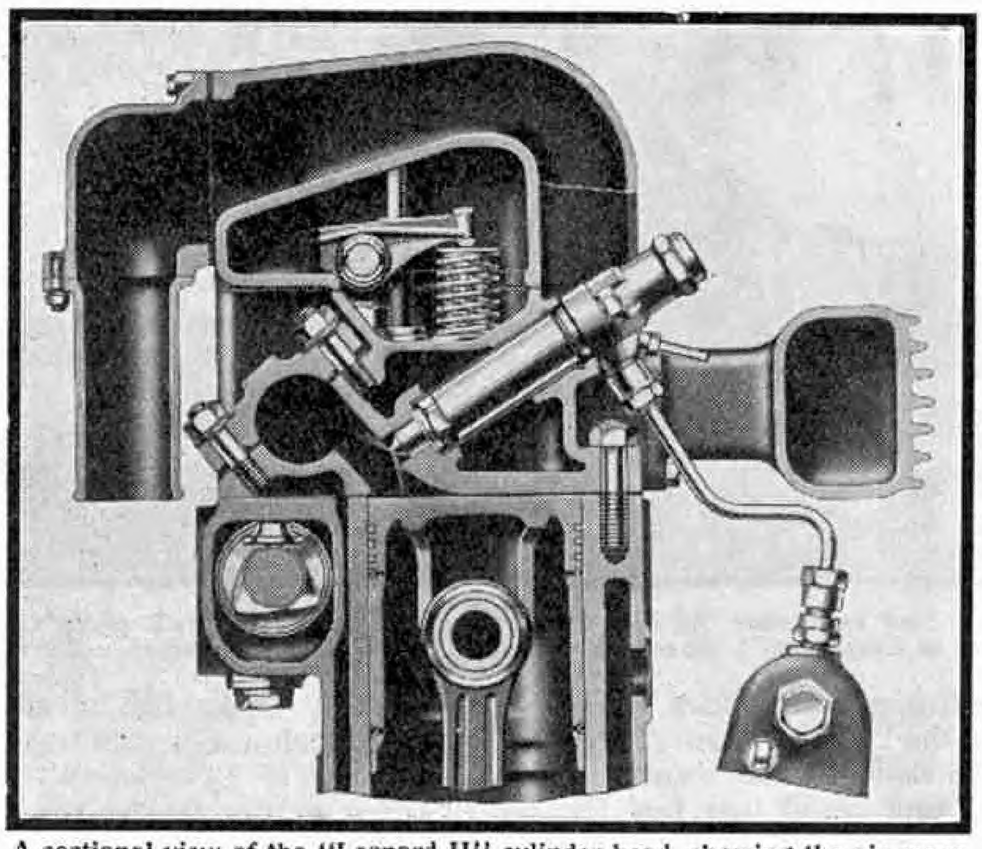
Some of the most successful Diesel engines for use in road vehicles are those made by F. Perkins Ltd., of Peterborough. This firm originally made three such engines. These were of various types and powers, and were known as the *"Vixen," "Fox"* and *"Wolf"* respectively. In October 1935 at Brooklands, a racing car fitted with a 65 b.h.p. *"Wolf"* engine, and driven by Mr. R. Munday, the famous racing motorist, created the first Three-Litre Diesel Class Records, the highest speed reached during this pioneer effort being 94.70 m.p.h. A description of Mr. Munday's car and details of the *"Wolf"* engine were given in the *"M.M."* for February 1936.

Later the firm introduced the *"Leopard I"* engine, and at a still later date this was followed by another power unit known as the Perkins *"Lynx,"* which was specially suited to small vehicles. Recently an oil engine of larger size and power than any of its predecessors has been introduced. This is the *"Leopard II,"* designed primarily to meet the demand for a Diesel engine for vehicles capable of carrying gross loads of about 10 tons. Although the engine is comparatively new, it has been tried out with success upon the Pampas and on rough tracks in remote parts of South America.

The *"Leopard II"* develops 75 b.h.p. at 2,400 r.p.m. and one of its outstanding features is its low weight in proportion to its power. The complete engine without electric starting equipment weighs only 608 lb., which is approximately 8 lb. for each horse power developed. The engine is of the four-cylinder type, the cylinder having a bore of 4 9/64 in. and a piston stroke of 5 in.

Like the earlier models, the *"Leopard II"* embodies a special combustion system known as "Aeroflow," but with certain improvements and modifications. The upper illustration on this page is a general view of the new engine, and below it is a sectional view of one of the four cylinder heads that shows how the "Aeroflow" system works.

The purpose of this system is to secure instantaneous and complete combustion of the fuel, so that the engine can work at high crankshaft speeds with a low maximum pressure in the cylinders. In the improved form used in the *"Leopard II"* engine the fuel is injected in three separate jets. Two of the jets are sprayed into an air cell or ante-chamber, adjacent to the cylinder and connected with it by an inclined passage that is narrowed in the middle to speed up the flow of the vapours through it. A tube narrowed in this manner is called a Venturi tube. The third jet is sprayed directly on to the rising piston in the cylinder. Fuel is injected towards the end of the compression stroke of the piston, and is fired by the instantaneous high temperature created by the maximum compression of the air in the cylinder.



A sectional view of the "Leopard II" cylinder head, showing the air space into which two jets of fuel are sprayed at the end of the compression stroke. A third jet is directed into the cylinder.

Engines incorporating the "Aeroflow" system are capable of running satisfactorily at high speeds, and can be started easily from cold without the use of auxiliary devices. In addition the system gives a saving in fuel. The actual consumption of the *"Leopard II"* is little more than a third of a pint of oil per brake horse power hour.

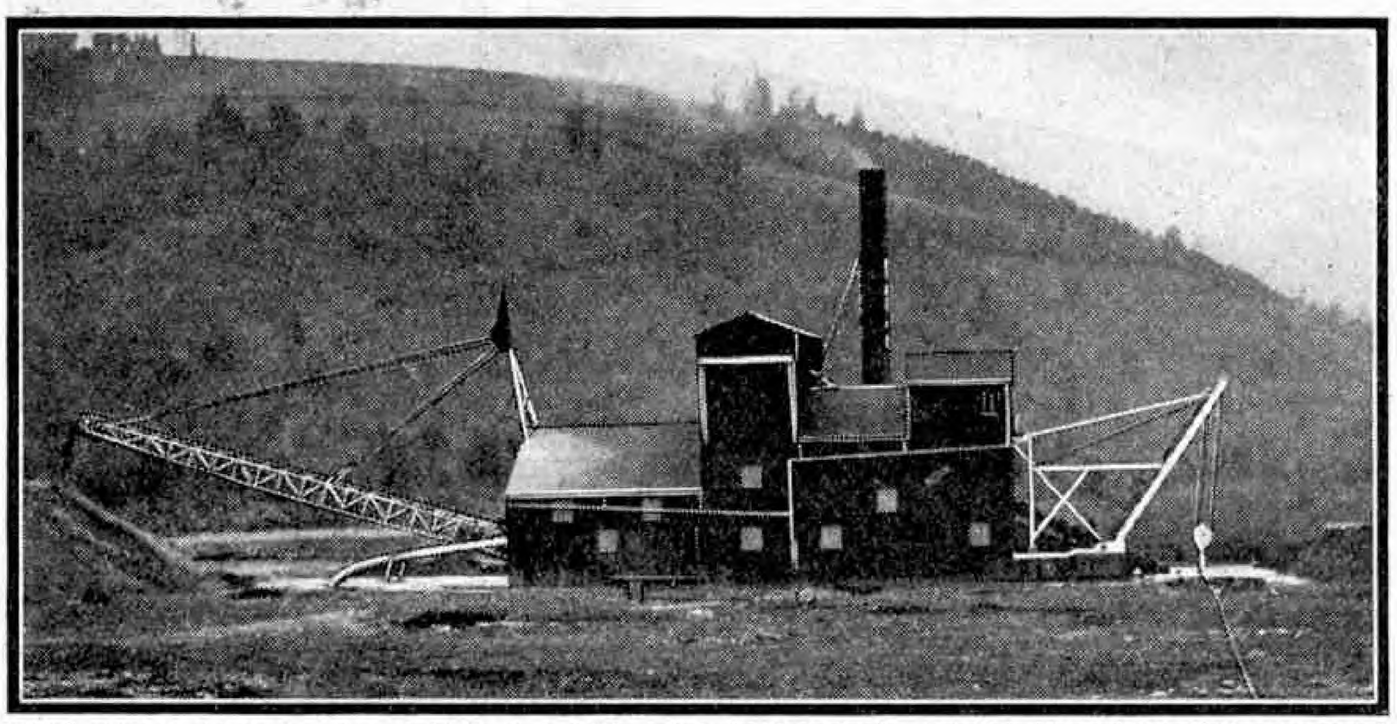
Gold Won from a River Bed

A Giant Dredge at Work in Yugoslavia

THE greater part of our store of gold comes from quartz through which run veins of the metal. This is mined at great depths underground, as in the rich mines of the Rand, in South Africa, where it is torn away by the aid of explosives and mechanical drills, and is then hauled to the surface. There it is ground with water by means of powerful stamping machines, and converted into slime that is passed over an inclined table made of copper plates coated with mercury. The mercury forms an amalgam with the gold, and this afterwards is heated in order to drive off the mercury, leaving the gold behind.

Gold also is found in soils and gravel, from which it is separated by washing away the lighter particles, the heavy gold remaining behind. Prospectors wash the pay dirt, as it is called, in pans in which the mixture is swirled round with water, and for work on a larger scale sluices and long boxes known as rockers are used.

The mud and gravel deposits in the beds of rivers often contain gold, and where the deposits are particularly rich in the mineral, special dredges are employed to dig out the deposits. The gold bearing material is passed through special plant on the deck of the dredge that separates the yellow specks of gold from the sand, soil and slime. These are returned to the water at the tail of the vessel.



The Lobnitz gold dredge at work in the bed of River Pek, in Yugoslavia. Another view of this dredge appeared on page 151 of the March "M.M." Photograph by courtesy of Lobnitz and Co. Ltd., Renfrew.

The illustration on this page shows a general view of a dredge of this kind that is designed to extract gold from the gravels in the bed of the River Pek, in Yugoslavia, or on the flats on each side of it. The dredge was made by Lobnitz and Co. Ltd., Renfrew, and was transported in sections to the site on which it was to be used. There the unit was built up and set into operation under the supervision of the builders. The hull was assembled and riveted in the usual manner, and it was then launched into a pond large enough to give the dredge freedom of movement. A large sheet of water is not required. As it moves forward the dredge digs out room in which to work as it advances, and fills up the space behind it with the tailings discharged over the stern and from the conveyor. It is manœuvred from side to side of the pond by means of wire ropes hauled in by steam driven winches. Work is carried on continuously day and night, and the output is about 200 cu. yds. an hour, material being brought up from depths up to 40 ft. below water level.

Steel buckets dig out the gravels from the bed and sides of the river. They are attached to each other in a continuous chain, which passes round tumbler rollers placed at each end of a strong girder, or "ladder," that projects through a well cut in the bows of the vessel. The ladder is so mounted that it can be lowered to any required depth during operations. The buckets are driven by a powerful steam engine. As they pass round the lower end of the ladder they scoop out the gravel, and then pass upward along the upper surface of the sloping ladder. On rounding the upper tumbler, they shoot their loads into a hopper, from which the material passes into a revolving screen of one quarter to half an inch in mesh, to be broken up by high pressure water jets that wash it thoroughly.

During screening the very fine gravel with which the gold is mixed passes through the perforations into a distributor that delivers it to gold saving tables. The coarser gravels and waste material that will not pass through the perforations continue along the screen, which slopes downward towards the after end of the dredge. There it falls on to a troughed conveyor belt, which discharges it over the stern.

The fine sands and gravels entering the gold saving tables are further washed by a supply of low pressure water. The tables are coated with mercury and covered with riffles that create turbulence as the water flows over them. Gold is a heavy metal, and some of the larger particles fall into the spaces between the riffles, where the finer particles form an amalgam with the mercury. The washed sands and gravels deprived of their gold continue their progress over the tables and are discharged, together with the waste water, over the stern of the vessel.

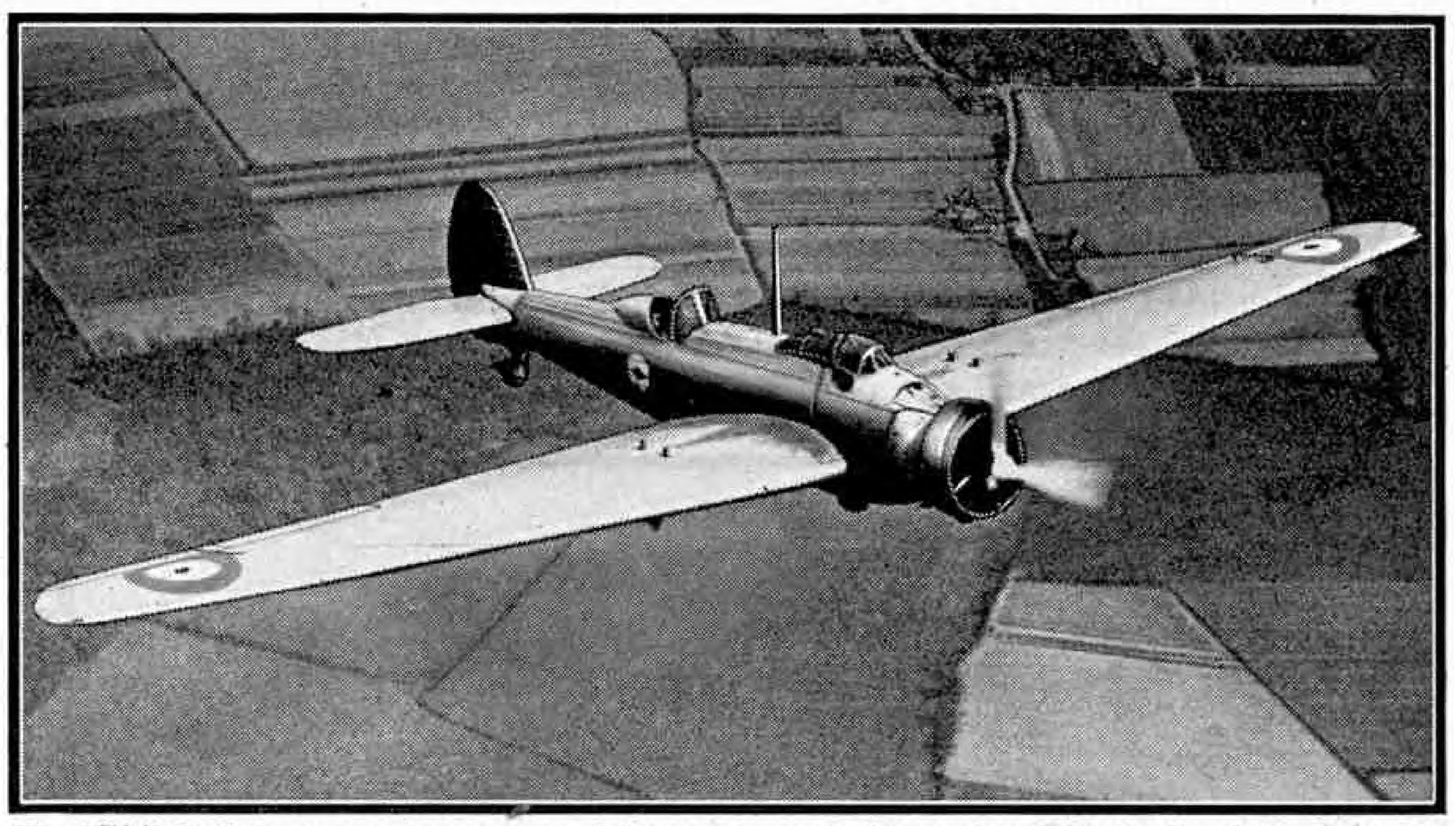
The gold recovered in this manner is removed from the saving tables periodically and put into "clean-up" boxes, where a further washing reduces still further the quantity of fine sand in the mixture. A plentiful supply of water at either high or low pressure as required is pumped to the gold saving tables by a steam operated pump housed on the deck of the vessel.

All the operations of the dredger are carried out by steam power provided by a Babcock and Wilcox dredger type boiler. This is designed for firing on wood fuel, which is both plentiful and cheap in the River Pek district, and supplies steam to six main units, which comprise the main dredging engine, pumps, manœuvring winch, electric generator and auxiliaries and a winch for raising and lowering the bucket ladder.

Vickers Military Aircraft

Varied Types of Bombers and Fighters

VICKERS aircraft have been included in the standard equipment of the Royal Air Force for many years. Two Vickers types that are extensively used by the R.A.F. overseas are the "Vincent" general purpose aeroplane and the "Valentia" troop carrier. Both are biplanes, and it is therefore interesting that the three latest Vickers aircraft to be adopted by the Service are monoplanes. They are the "Wellesley" and "Wellington" long range bombers, and the Vickers Supermarine "Spitfire I," day and night fighter. These interesting machines, together with the "Venom" high-speed single-seater fighter, are described in this article.

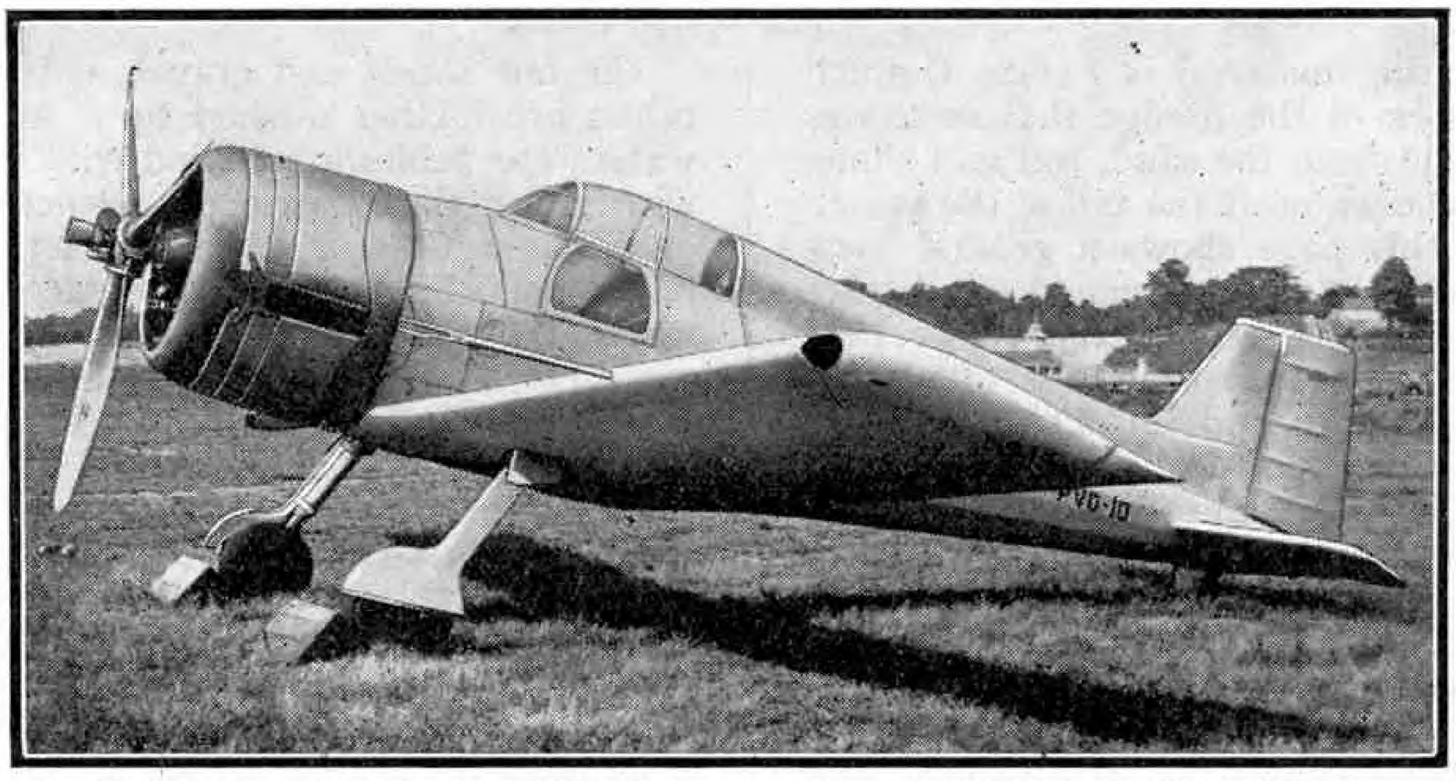


The "Wellesley" long range bomber, one of the new types of Vickers aircraft for the Royal Air Force. The illustrations to this article are reproduced by courtesy of Vickers (Aviation) Ltd.

The "Wellesley" is a low wing machine, and although no performance figures can be published its high efficiency is indicated by the fact that the Air Ministry contract for this machine is one of the largest ever placed for an aeroplane of entirely new construction. This new method of construction is called the Vickers-Wallis "Geodetic" system, and has been evolved only after a long period of experiment and research. Full details of it are not available for publication, but it may be briefly described as employing intersecting members and rendering unnecessary the customary frames, ribs and bulkheads. This enables both wings and fuselage to be entirely free from internal obstruction. Such a system is highly economical, as it enables the maximum internal space to be used for accommodating fuel tanks, freight holds, and crew and passenger accommodation. Another important point is that the system combines lightness with great strength and rigidity.

The "Wellesley" monoplane has a range and load-carrying capacity that previously were considered unattainable, and when the machine is loaded only with fuel it has a range sufficient to enable it to fly to any part of the British Empire without landing on foreign soil to re-fuel. With ordinary military load it can fly from England to Athens, Naples, Copenhagen, Helsingfors or Leningrad and back without refuelling.

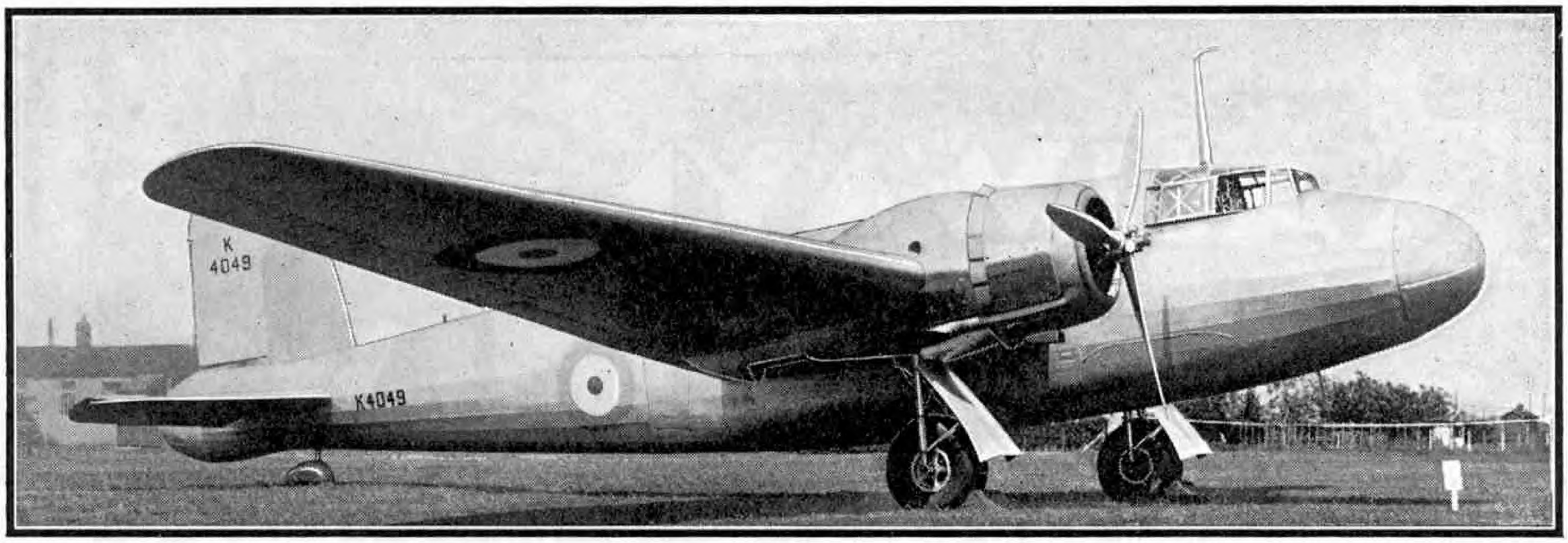
A few structural details about this remarkable aeroplane can be given. It is of all-metal construction, with a fuselage of oval cross-section, and has a retractable undercarriage, the wheels of which are drawn up into recesses in the underside of the wings when the aeroplane is in the air. The engine fitted is a Bristol "Pegasus X," supercharged and developing 950 h.p. The "Wellesley" is classed both as a bomber and a general purpose aircraft, and carries a pilot and observer, whose cockpits are situated one behind the other. The main dimensions are span 73 ft. 6 in., length 39 ft. 1 in. and height 14 ft. 7 in.



The Vickers "Venom" single-seater fighter. This machine has a three-bladed controllable-pitch airscrew.

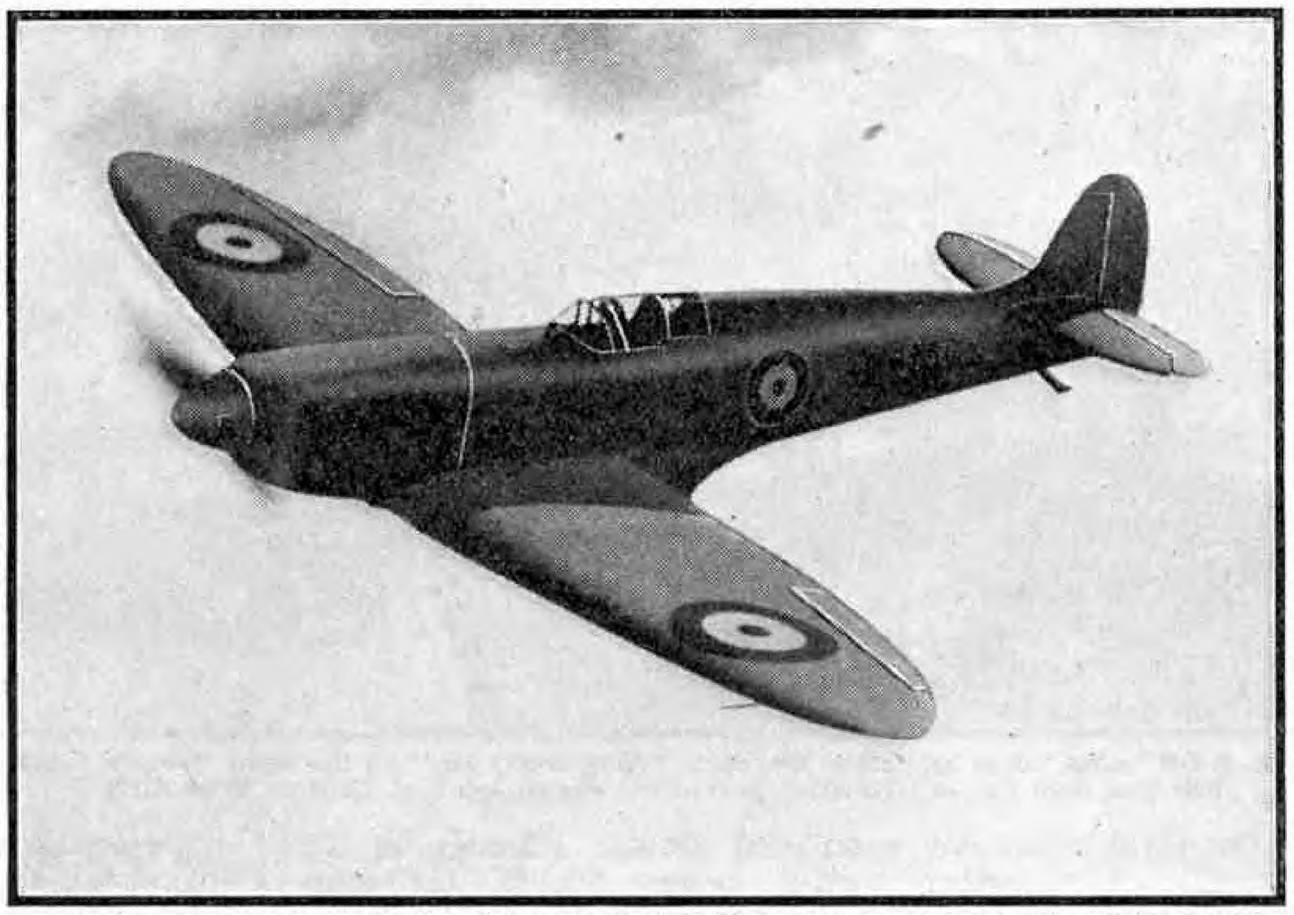
Another Vickers type designed and built on the "Goedetic" principle is the "Wellington I" high performance bomber shown in the upper illustration on the next page. It is a mid-wing monoplane with the same clean "airship" streamline form as the "Wellesley," and has a very light structural weight, with a corresponding increase in useful load. This load, together with the high rate of cruising speed available, would have been considered an impossible proposition two years ago. Each of these types is an important addition to the R.A.F., and will provide the Service with bombers of unsurpassed efficiency.

The "Wellington I" is slightly larger than the "Wellesley," and is 85 ft. 10½ in. in span, 60 ft. 6 in. in length and 18 ft. 9 in. in height. The wings are built of duralumin and



are covered with fabric, as also are the fuselage and tail unit. The enclosed accommodation for the pilot is well forward, being just in front of the leading edge of the wing. Provision is made for from four to seven people to be carried, and there are three gun positions, one in a turret in the nose of the fuselage, one in the upper part of the fuselage and slightly more than half way along the machine, and the third in a turret at the stern. Two Bristol "Pegasus X" engines are used for this bomber, and they occupy nacelles that project from the leading edge of the wings, one on each side of the fuselage. There is a recess in the underside of each nacelle to receive one of the undercarriage wheels when the aeroplane is in the air. A noticeable feature of the "Wellington I" is the absence of noise, and it is particularly silent even when flying at maximum speed.

The other two monoplanes illustrated are single-seater fighters. The "Venom," shown in the lower illustration on the opposite page, is of all-metal construction, with fabric covering for the wings, fuselage and tail unit. This aeroplane resembles its predecessor, the Vickers "Jockey," which was described in the May 1932 *"M.M."* It has proved a valuable medium for the introduction of many improvements and modifications, one that can be mentioned being an electrically-operated retractable undercarriage. When the aeroplane is in flight the wheels and undercarriage are drawn up into the wing roots, and blades attached to the wheels and legs then close over the apertures. The enclosed cockpit has been re-designed with a modern and convenient grouping of the instruments, and is now roomy and provides a wide field of view for the pilot. The Bristol "Aquila" supercharged engine is fitted in the nose of the fuselage, and is enclosed in a cowling equipped with controllable flaps. A three-bladed de Havilland controllable-pitch airscrew is used. The "Venom" is a much smaller aeroplane than the bombers, and is only 24 ft. in length, 32 ft. 9 in. in span and 10 ft. 9 in. in height.



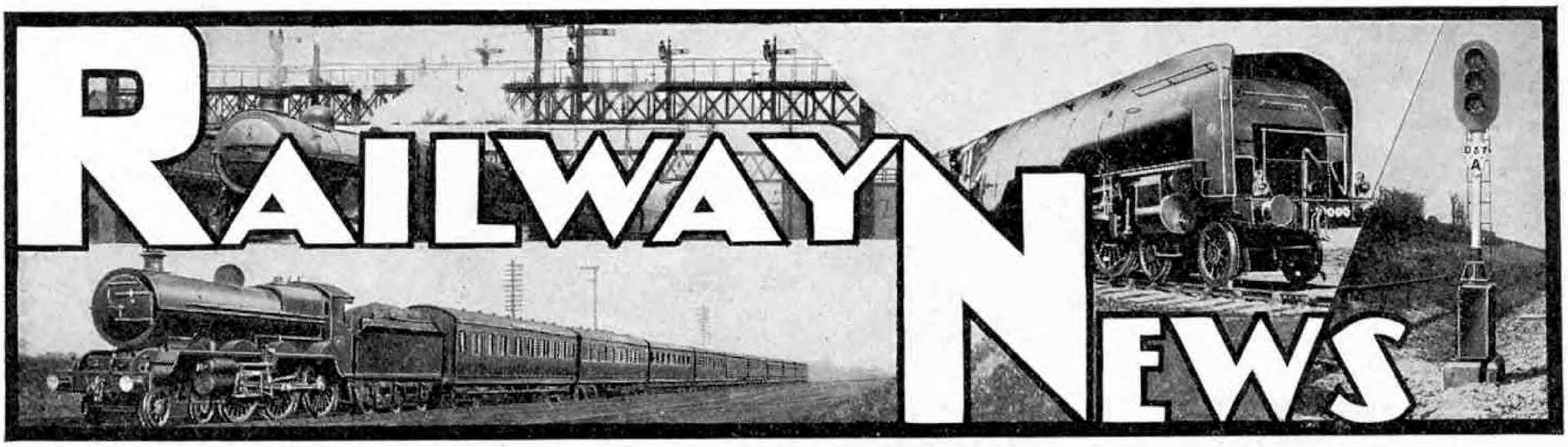
The Vickers Supermarine "Spithre I," photographed from another machine. The design of this single-seater fighter embodies many of the best points of the supermarine aircraft built for the Schneider Trophy Contests.

The upper illustration is a fine view of the Vickers "Wellington I" twin-engined long range bomber. An interesting feature of this aeroplane is the bulbous stern.

In November 1928 Vickers (Aviation) Ltd. acquired control of the Supermarine Aviation Works Ltd., and thus the Supermarine "Spitfire I" illustrated on this page, is classed as a Vickers product. The Supermarine company are best known as the builders of several fine types of military flying boats and of high-speed seaplanes. They produced many of the British seaplanes that took part in the Schneider Trophy contests, including the machine that won the Trophy outright for Great Britain in 1931, and the design of the "Spitfire I" reveals the influence of the pioneer work carried out in designing and building the machines for those contests. It also embodies the latest technique developed by the Supermarine company. This is a stressed-skin form of construction that gives exceptional stiffness to wings and fuselage for a structure weight never before attained in this class of aircraft, and also provides the perfectly smooth outer surface so essential for flight at very high speeds.

Very few details are available about this aeroplane. It is known to be of all-metal construction, and like practically all modern aircraft, it has a retractable undercarriage. The engine is a Rolls-Royce "Merlin," and although no performance figures have been made public, it is claimed that the "Spitfire I" is the fastest military aeroplane in the world. It is of interest to note that it is the first Supermarine landplane to be ordered in quantity by the Air Ministry.

The Supermarine company are also the builders of the "Walrus," a single-engined biplane. This machine is an amphibian, as it is fitted with both a land undercarriage and with twin floats. The "Walrus" is designed for fleet-spotting duties, and it has been adopted by the Admiralty for the Fleet Air Arm. It has also been ordered by the Royal Australian Air Force.



New L.N.E.R. Train *"East Anglian"*

In the Autumn of this year the L.N.E.R. are to inaugurate a new express train between Norwich and London. One stop will be made at Ipswich, and the journey will be completed in 2¼ hours.

The train, which will be known as the *"East Anglian,"* will operate only on Mondays to Fridays. It will leave Norwich at 11.55 a.m., Ipswich at 12.50 p.m., arriving at Liverpool Street at 2.10 p.m. The departure times for the return journey will be Liverpool Street 6.40 p.m., Ipswich 8.4 p.m., arriving at Norwich at 8.55 p.m. New rolling stock will be provided for the train, which will be hauled by a streamlined locomotive of the "Sandringham" class.

L.N.E.R. 120-ft. Rails Now in Use

The new steel rails 120 ft. in length, mentioned in the *"Railway News"* page last month, have now been laid in the L.N.E.R. down main line at Holme, near Peterborough. Their laying created a number of problems, but these were successfully overcome. The handling of the new rails and their behaviour in service are of great technical interest, and the experiment is being watched carefully by the L.N.E.R. engineers as well as railway engineers all over the world.

Regiment Hauled by its Own Locomotive

The 2nd Battalion of the Essex Regiment recently returned to Warley Barracks, Brentwood, after over 17 years foreign service. By special request the L.N.E.R. arranged for engine No. 2858, *"The Essex Regiment,"* to haul the train in which the journey from Victoria Park to Brentwood was made.

Partitioned Wagons for Fragile Loads

The G.W.R. are to build 50 goods wagons that have been designed specially to reduce to a minimum the damage to which eggs, soft fruit and other fragile freights are susceptible. The interiors of the wagons will be fitted with a series of partitions that can be adjusted to hold the stacked goods firmly in position, no matter how small the load may be. Experiments have proved that this scheme is the best so far devised.

Modernising L.M.S.R. Engine Sheds

The engine sheds at Carlisle (Kingmoor), Perth, Newton Heath, Aintree, Mold Junction, Goole, Huddersfield, Stafford, and Stranraer are to be modernised. Provision is to be made for the installation of mechanical coaling and ash-disposal plants and other new machinery, together with the improvements in the layout of the sheds, so that a quicker turn-round of locomotives is possible.

During the past year the L.M.S.R. have completed similar schemes at 15 other motive power depots, including Derby, Nottingham, Leeds, Bolton, Camden, Preston, and Bank Hall.



G.W.R. 4-6-0 "King" class locomotive No. 6025, "King Henry III," on the down "Torbay Express" emerging from Parson's Tunnel near Dawlish. Photograph by J. G. Muir, West Kirby.

Special Trains during Coronation Week

During Coronation Week next month, the resources of the railway companies will be taxed to the full, and special arrangements are being made to cope with the expected rush to London. The L.M.S.R. are to run 130 special trains, bringing 65,000 passengers from the provinces up to London. Special arrangements have been made also for the serving of meals on the excursion trains, and on a special buffet car excursion from Liverpool on Saturday, 15th May, 1,000 passengers will be served at one sitting.

The G.W.R. report heavy advanced bookings to London for Coronation week and between the 8th and 22nd of May, 150 special excursion trains will be run to Paddington. Of these, 25 will arrive between 12.30 a.m. and 6.30 a.m. on Coronation Day.

Railway Demonstrations for School Children

In co-operation with the education authorities of Bradford and Leeds, the L.N.E.R. recently arranged for two educational demonstrations of practical railway working. Arrangements were made for school children to be taken round the various exhibits, which in each case consisted of one of the latest streamlined "Pacific" engines, No. 4482, *"Golden Eagle,"* the working of which was explained by a well-known L.N.E.R. driver; a signal instruction van; two locomotive demonstration vans; a travelling post office; a mail van; a dining and kitchen car; a camping coach and a tourist buffet car. Explanations were given by railway specialists.

The demonstrations were of particular interest to the West Riding in view of the introduction this year of the high-speed train between Bradford and Leeds and London by the L.N.E.R. *"Golden Eagle"* type locomotives will be used for working this train.

Additional L.N.E.R. Station in Yorkshire

A halt is to be constructed at Kingsley Road Bridge, between Hemsworth and Nostell Stations, on the Doncaster to Wakefield Line of the L.N.E.R. This halt will serve several mining villages, all of which are within a radius of about 1¼ miles from Kingsley Road, and will have a 350 ft. island platform.

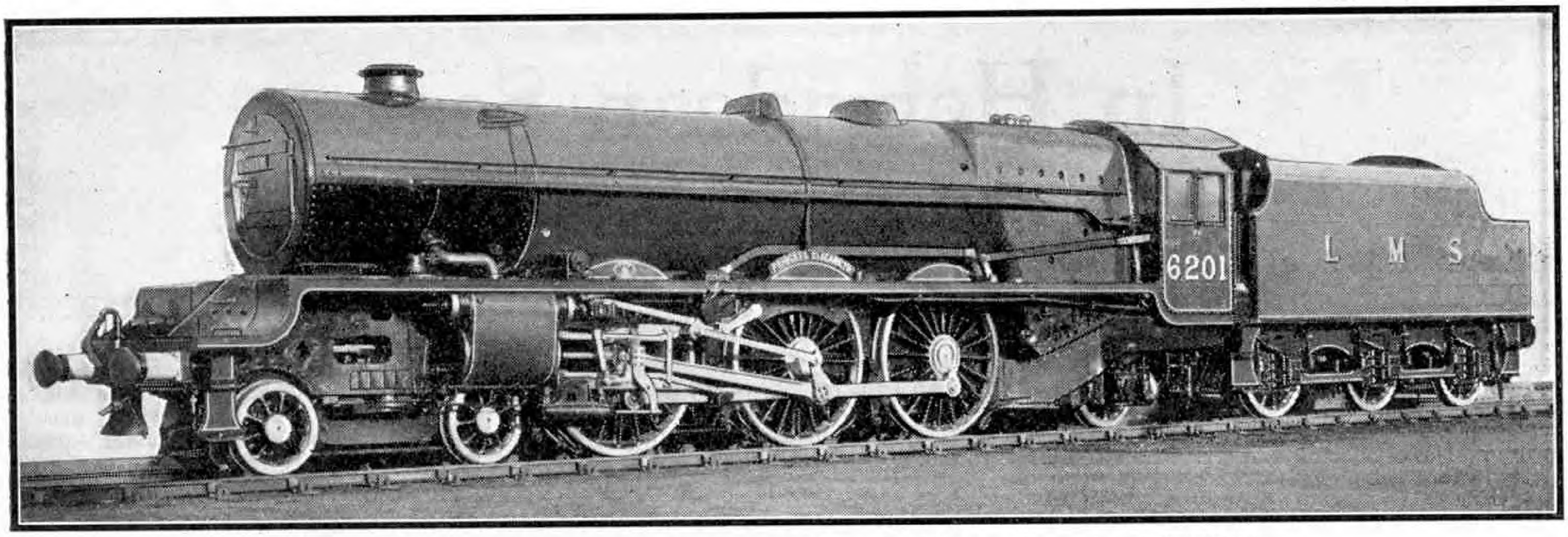
S.R. Camping Coaches

A hint of the approaching summer was given by the Southern Railway when a series of camping coaches was recently on view at various S.R. stations.

The coaches, each of which accommodates six people, are placed at some of the finest beauty spots on the Southern Railway system. The camper has been studied to the last degree, and the equipment includes an alarm clock and even a wireless aerial for the use of those taking their own portable wireless sets.

* * * *

L.M.S.R. 2–8–0s Nos. 8017–20/8089–94, 2–6–4Ts Nos. 2479–82/2615–17 and 4–6–0s Nos. 5308–21 are in traffic. "Prince of Wales" 4–6–0s Nos. 25640/25819 and "George the Fifth" 4–4–0s Nos. 5380/95 and 25307/87 have been scrapped.



"Princess Elizabeth," the L.M.S.R. record-breaking 4-6-2 locomotive. Photograph by courtesy of the L.M.S.R. A magnificent scale model of this is shortly to be introduced into the Hornby Series.

A Magnificent French "Pacific" Run

A superb example of Nord locomotive performance was provided recently on the northbound "*Golden Arrow.*" This train is always very heavy, for it brings forward from Paris the through sleeping cars off the night express from the Mediterranean, and on this occasion the gross load was 560 tons. The engine was a Nord "Super-Pacific," No. 3.1259. One of these engines, No. 3.1280, has now been streamlined and is illustrated on this page. Weather conditions were anything but favourable, for heavy rain continued without a break all the way from Paris to Boulogne. In spite of this No. 3.1259 dashed away from the Gare du Nord in great style and was doing 65 m.p.h. as early as St. Denis, 3.8 miles out. Speed never fell below 50½ m.p.h. on the 14-mile bank at 1 in 200 to Survilliers, and on the corresponding descent past Chantilly a steady 75-77 m.p.h. was maintained for some 10 miles. Slacking carefully to 55 m.p.h. over the junctions at Creil, this station, 31.2 miles out, was passed in 32¾ minutes.

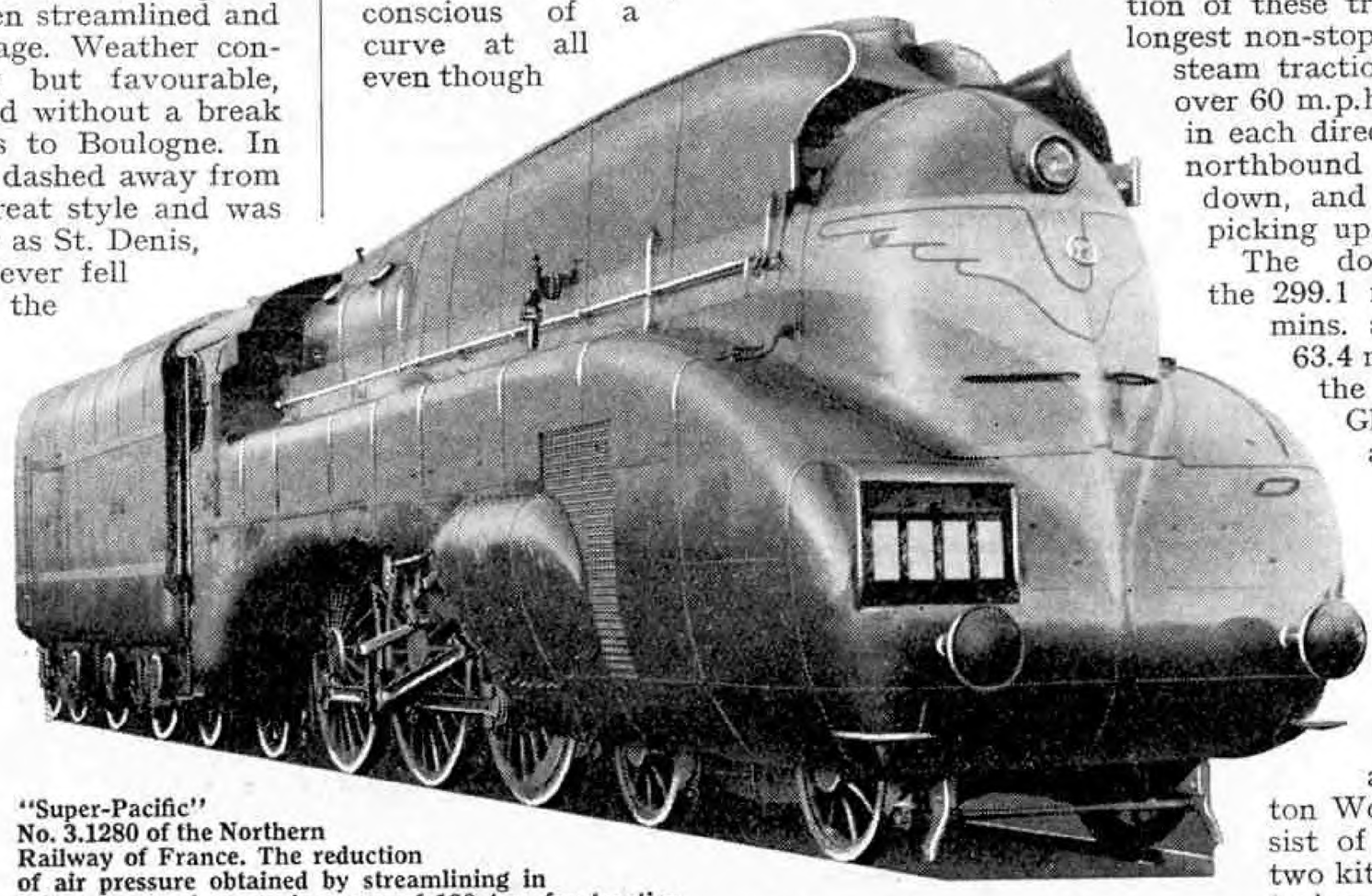
Grand work followed up the long ascent to Gannes, Speed rose to as much as 68 m.p.h. at Clermont, and then up 14 miles of almost continuous 1 in 250 grade, an average of 57 m.p.h. was maintained. Until recently the maximum speed allowed by law in France was 120 kilometres per hour, or 74½ m.p.h. This has now been increased to 130 on certain routes, however, and descending towards Amiens there was a long spell at 82 m.p.h. Speed was carefully eased for the curves at Longueau, and then Amiens, 81.1 miles from Paris, was passed in 80¼ minutes at the usual slow speed of 20 m.p.h.

The finest running was yet to come, however. Acceleration from the Amiens slack was delayed somewhat by a "caution" beyond Saint Rock, but then No. 3.1259 got away to some purpose. Passing Ailly-sur-Somme at 70 m.p.h. speed rose, on the dead level, to 77 m.p.h. at Pont Remy and the 22 miles from Ailly to Abbeville were reeled off at an average of 73.4 m.p.h. The pace was eased to 66 m.p.h. through Abbeville, but the train was soon travelling at 75 m.p.h. again, still on a perfectly level track! Permanent way operations compelled a slack to 35 m.p.h. near Ponthoile-Romaine, but by St. Josse speed was up to 72 m.p.h. again, before the slight easing through Etaples. The curve there is really sharp, but the track is so splendidly laid that one was scarcely conscious of a curve at all even though it was taken at 62 m.p.h. With a speedometer on the locomotive the driver of course can adjust his speed to the exact figure for which the track is super-elevated. Etaples was passed in 135½ minutes, for the 140.6 miles from Paris, and after recovering to 63½ m.p.h. near Dannes-Camiers, the three-mile bank at 1 in 130 was mounted at a minimum speed of 44 m.p.h. After a final maximum of 72 m.p.h. at Hesdigneul, Pont de Briques, 154.4 miles, was passed in 149¼ minutes; but signals at the finish caused some delay, and the 157.5 miles into Boulogne (Ville) were completed in 154¾ minutes, just 15 seconds inside schedule, net time being 151½ minutes.

This run was recorded by Mr. O. S. Nock.

* * * *

L.M.S.R. "Baby Scot" No. 5500, formerly "*Croxteth*" is now named "*Patriot.*"



"Super-Pacific" No. 3.1280 of the Northern Railway of France. The reduction of air pressure obtained by streamlining in this manner gives an increase of 120 h.p. for traction at a speed of 74½ m.p.h., until recently the maximum allowed in France.

Streamlined Engines on L.M.S.R.

Following the record-breaking test runs carried out by the L.M.S.R. on the West Coast Route between London and Glasgow last November, it has been decided to introduce, on July 5th, two new trains that will leave Euston and Glasgow (Central) respectively at 1.30 p.m. They will cover the journey of 401.4 miles in 6½ hours, at an average speed of 68 m.p.h. The introduction of these trains will inaugurate the longest non-stop runs in the world with steam traction, at average speeds of over 60 m.p.h. One stop will be made in each direction at Carlisle, on the northbound journey, for setting down, and on the up journey for picking up.

The down train will cover the 299.1 miles to Carlisle in 283 mins. at an average speed of 63.4 m.p.h., start-to-stop, and the 102.3 miles forward to Glasgow in 105 min. at an average start-to-stop speed of 58.5 m.p.h. Similar average speeds will be maintained over the same sections of the up journey.

Three new trains for this high-speed service are being built at the L.M.S.R. Wolverton Works, and each will consist of nine coaches including two kitchen cars. The complete trains will each weigh 283 tons and, including the engine, each will have an overall length of 540 ft. There will be accommodation for 82 first-class and 150 third-class passengers.

Although the record runs of 4–6–2 No. 6201, "*Princess Elizabeth,*" proved that streamlining was not absolutely essential for the maintenance of high speeds over long distances, the five engines that are being constructed at Crewe specially for the new service are being streamlined in order to take advantage of the increased economy realised at speeds of over 70 m.p.h. They will be generally similar to "*Princess Elizabeth,*" but will be fitted with larger boilers and fire-grates, and with driving wheels 6 ft. 9 in. in diameter. They will be provided also with larger tenders with a coal capacity of 10 tons and accommodation for 4,000 gallons of water.

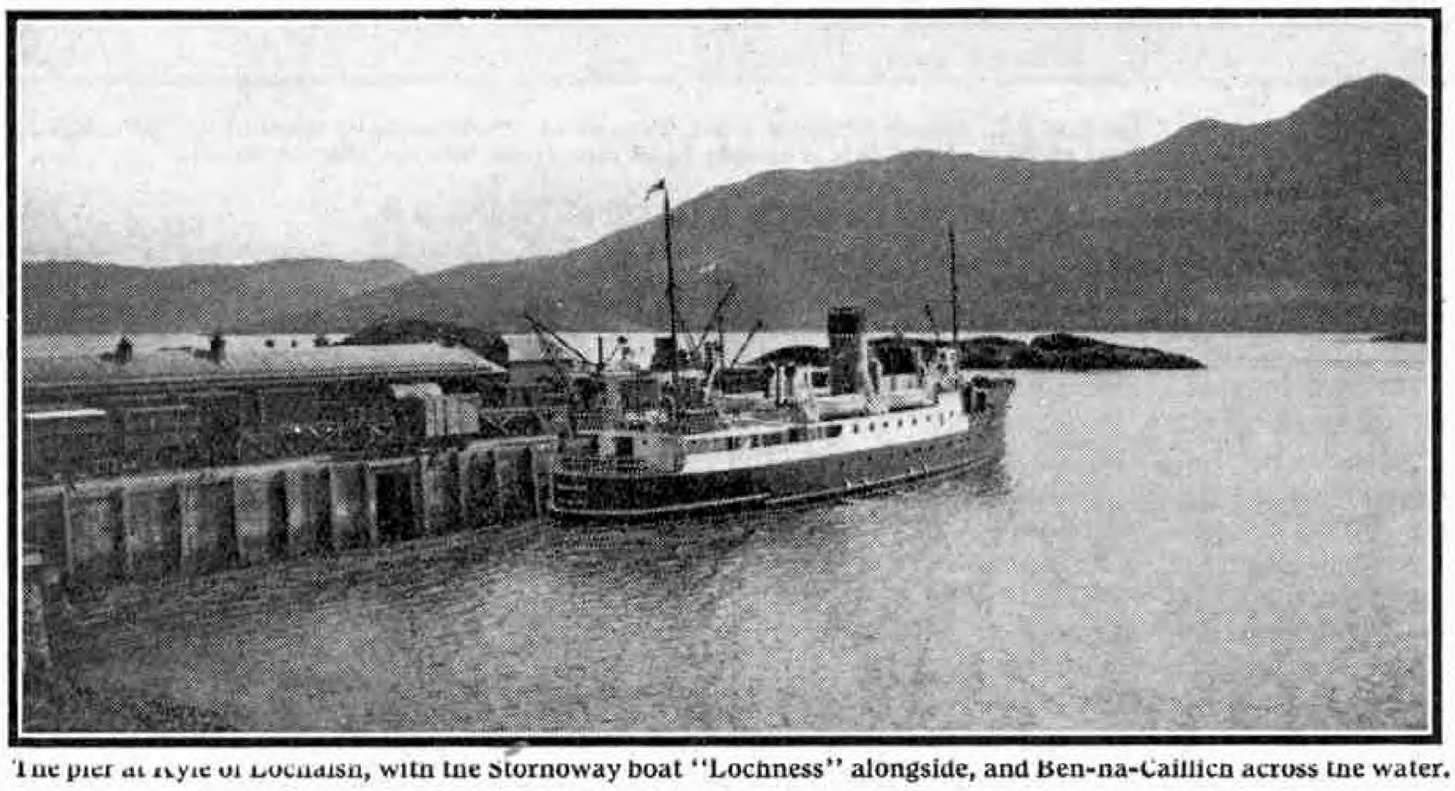
In Hebridean Seas

I.—Lochalsh to the Outer Isles by "*Lochmor*"

By O. S. Nock, B.Sc., D.I.C.

FROM my bedroom window in the cosy L.M.S. hotel I looked out on to the Kyle of Lochalsh. It was 5.30 on a September morning. Although dawn was only just coming, there was enough light to reveal, in silhouette, the form of Ben-na-Caillich across the water, and just above, the stars of Orion flashed with the keenness of mid-winter. Down at the jetty in the light of the quayside lamps I could just pick out the red funnel of the "*Lochness*," lately arrived from Stornoway; but the sturdy little "*Lochmor*" in which I was to sail in half an hour's time was hidden behind the station buildings.

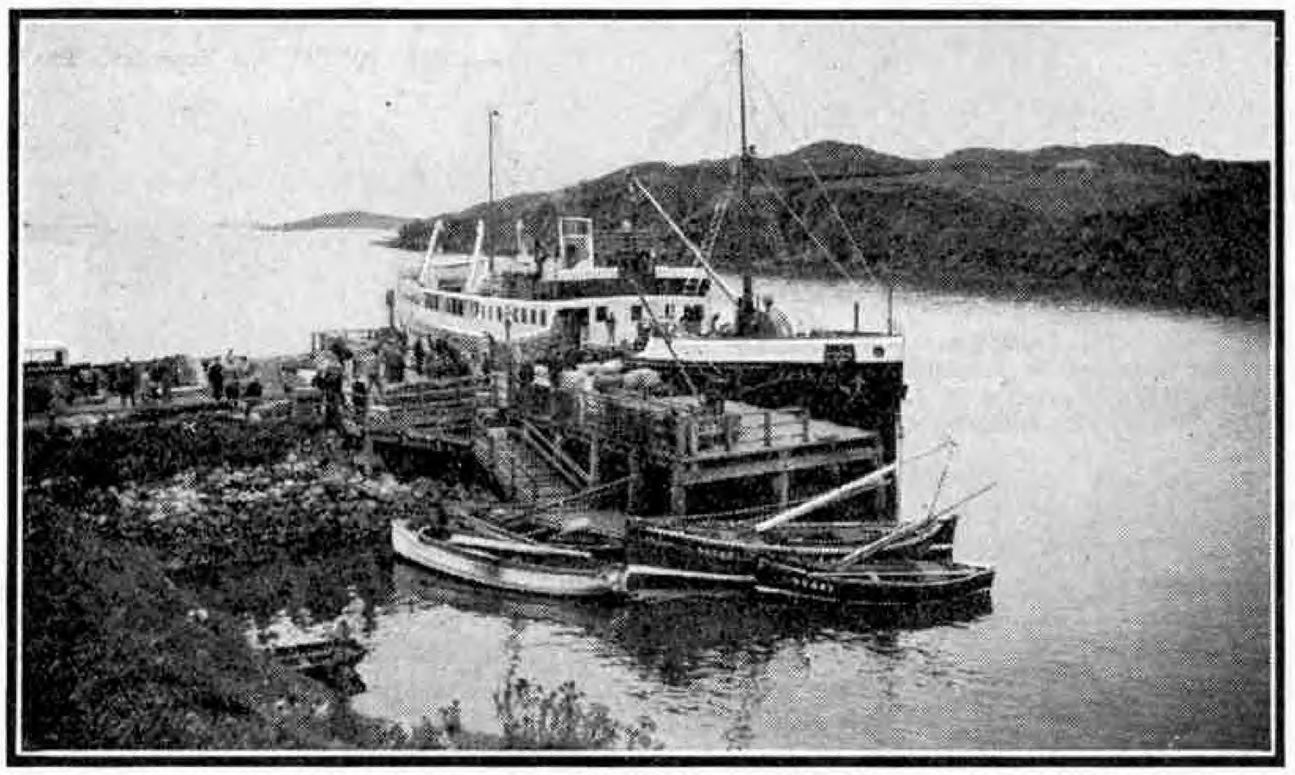
The "*Lochmor*" works on the Outer Isles service of David Macbrayne Ltd. From Kyle of Lochalsh she makes for Tarbert, in Harris, and then sails down the chain of islands, calling at little harbours on the edge of nowhere, or so it seems. From Lochboisdale, in South Uist, she crosses to the mainland again, calling at some of the inner islands on the way. It is one of the most fascinating voyages possible along the British Coast.



The pier at Kyle of Lochalsh, with the Stornoway boat "Lochness" alongside, and Ben-na-Caillich across the water.

To these distant isles there goes one of the jolliest little ships imaginable. Technically she is a Diesel-driven twin screw vessel of about 600 horsepower, but it is by her other qualities that she is best known to countless travellers in these wild seas. Her whole atmosphere is intimate and friendly, and her leisurely speed of about 10 knots is in keeping with the quiet unhurried life of the Outer Isles.

When I got down to the quay the "*Lochness*" had left for Mallaig, and I could see her lights disappearing down the dark waterway through the mountains. Just before starting time I met the Captain. In the remote islands that she serves the "*Lochmor*" is not merely a ship, she is "The Boat," the one means of communication with the rest of the world; and as such her commander would in any case be a local figure of no small importance. But Captain Robertson contributes not a little to this role by his own extraordinarily vivid personality.



The "Lochmor" at Tarbert, Harris, one of the ports of call on the trip described in this article.

It was still quite dark when we got away at 6 a.m. As we came out of the narrow Kyle and into the broad waterway at the entrance to Loch Carron, the complete circle of mountains that surrounded us looked superb in the strengthening light. On our port bow were the Cuillin Hills of Skye, the most awe-inspiring group of mountains in the British Isles; the splintered crags and precipices of their summits stood out very clearly, all a soft violet blue. Farther east were the smooth rounded crests of the Red Hills, and then came the rocky island of Raasay. On the mainland mist hung over the nearest hills, but astern Ben-na-Caillich, right opposite Kyle pier, reared up black as pitch against a lemon-yellow sky, and in the middle of this blackness shone Fladda beacon, a pin-point of red light.

Soon the sun was coming up, and from this very point in the sky a fan-shaped expanse of cirro-cumulus cloud spread upward; to the left the hills of Loch Carron loomed bluish black under lowering clouds, but in the direction of Lochalsh the sky was brilliantly clear, and the fine peaks of Kintail were showing up. And now this beautiful fan-shaped patch of sky became gilded with the light of the rising sun. Every particle of cloud glowed a brighter orange until the sea beneath shone with a purple iridescence and the white paintwork of the "*Lochmor*" gleamed rosy-pink. The early mistiness of the Cuillin Hills changed to a startling grape blue, and all around there were new and wondrous colours. On the mainland Applecross was just abeam; mist was still clinging to the higher ridges of the moorland, and these billowy masses of cloud also became tinged with purple.

Now we were drawing abeam of Dun Can, the highest point of Raasay island. This mountain, with its characteristic flat table top, rises very little above the rocky backbone of the island. The steamers for Skye itself sail through the channel between Scalpay and the south end of Raasay; then, after calling at Broadford, they sail up the Sound of Raasay to Portree. This little town, the metropolis of Skye, lies almost due west, behind Dun Can.

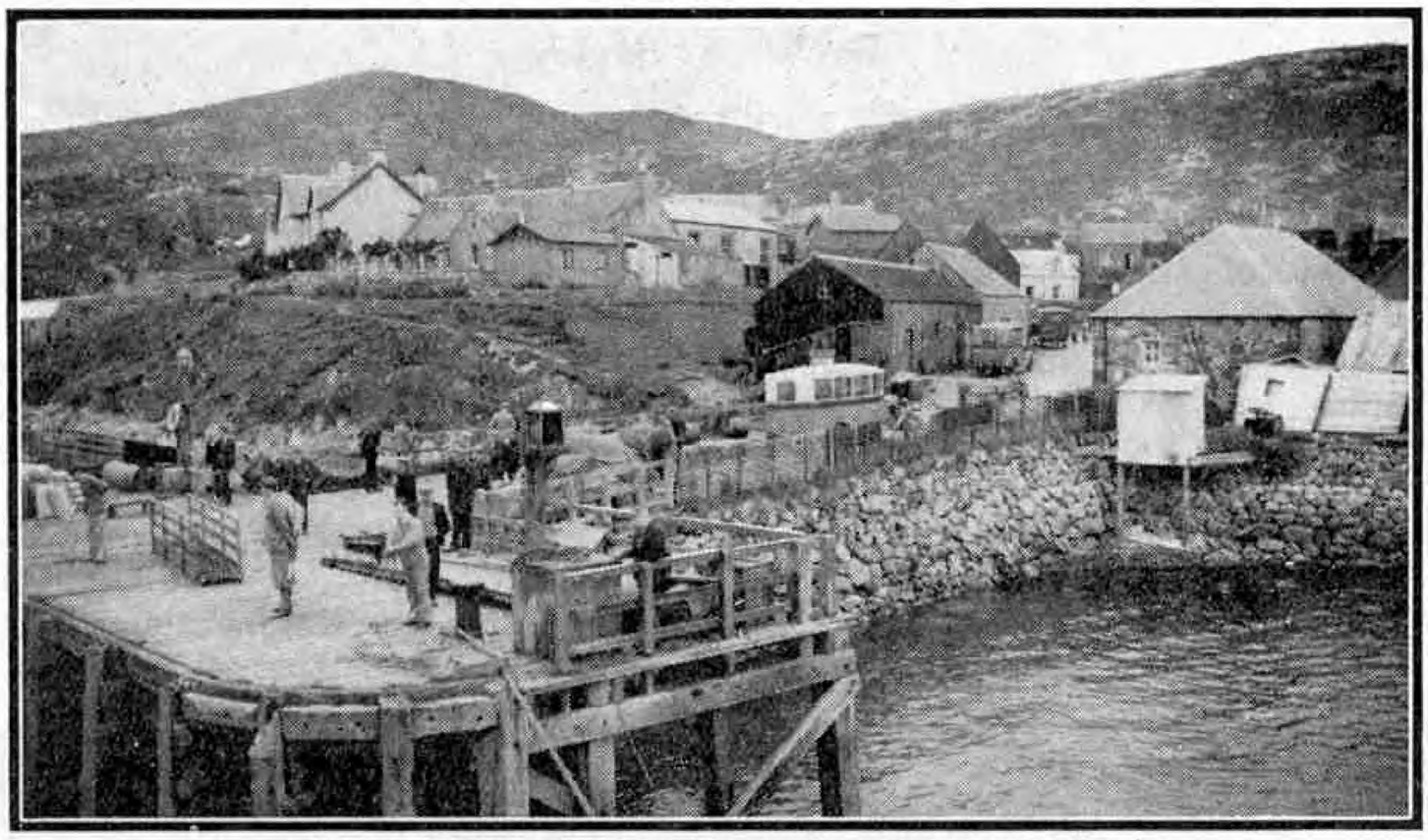
Just off the north end of Raasay is the island of Rona. We were making for the narrow sound that separates the two; in calm weather it is an easy passage for a ship of such shallow draught as the "*Lochmor*," and it saves a mile or so in distance. We passed within a hundred yards of the north end of Raasay and came out into the sound in full view of the east coast of Skye. The towering crags of the Storr were right opposite, and to the south far away now the Cuillins looked more impressive than ever—an amazing skyline of incredibly jagged peaks, deep clefts and crooked pinnacles.

From its northern end Raasay looks a curious jumble of rocks. The headlands shielding the entrance to Portree bay could be seen and the sun was glinting on the Storr. Mist hung like a thin veil over its summit, but this drooping curtain of white showed up with extraordinary vividness an isolated pinnacle 50 ft. high, shooting up from a ledge just beneath the highest crags—the Old Man of Storr.

Looking east towards the mainland the mountains of Torridon now rose blue above the rocky hillocks of Rona, and far to the north were range upon range of hills stretching away till their dim shapes blended into the greyness of the sky. Although it was becoming

rather overcast there were still many patches of clear blue, and for a few moments the whole Storr ridge was in sunlight. One of the most noticeable points about the landscape of this northern end of Skye is the brilliant colour of the grass. Now even the blackest crags were streaked with this vivid green, and the smoother slopes below were even brighter.

The cliffs along this part of the coast are of columnar basalt, not so perfect as in the Isle of Staffa or at the Giant's Causeway in Ireland, but nevertheless very fine. Towards the north end of Skye the coast line becomes less spectacular, but now it is the prospect to the north-west that claims our attention.



Tarbert, Harris, seen from the "Lochmor" as she approaches the pier.

Over the sea, stretching a great way across the horizon, was a line of grey hills; some of them look fairly high, but all their summits are very smooth and rounded. This is our first glimpse of the island of Harris. I have written "island," but strictly speaking Harris is only one part of the northernmost island of the Outer Hebrides. The larger part of this same island is called Lewis; not only are the two portions part of different Scottish counties, however, but their physical characteristics are so dissimilar that they are invariably spoken of as separate places. Lewis belongs to Ross-shire, but Harris and all the rest of the Hebrides are part of Inverness-shire. As we passed the northern extremity of Skye, stretching far away to the south on the western horizon, were the high lands of further isles; some showed up as nothing more than thin grey streaks on the sea, and farthest away of all were three little hummocks, the mountains of North Uist.

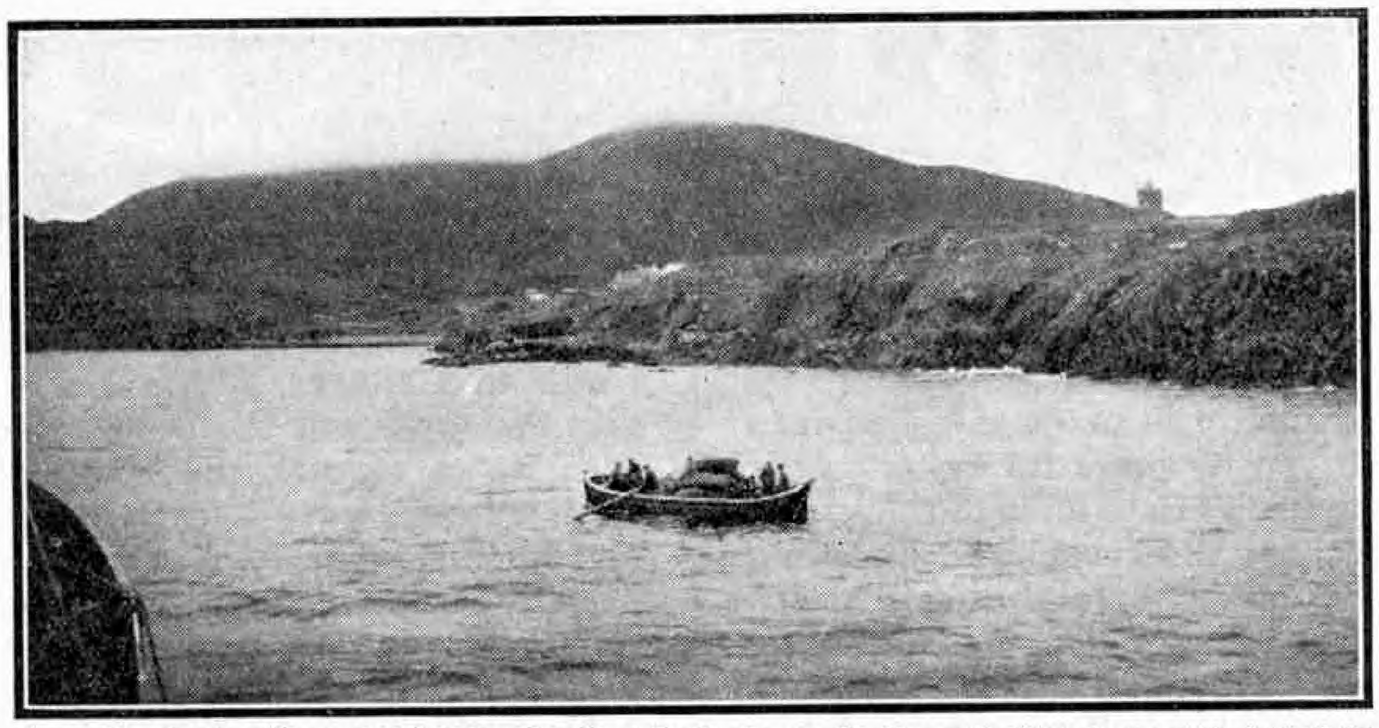
For the next hour we were crossing the North Minch. It was fascinating to watch the distant chain of islands gradually take shape. We passed just to the north of the Fladda isles, a small group of wicked-looking black rocks; one of these is shaped like a truncated cone, with a perfectly flat top, and is known as Lord Macdonald's Table. Then, when still some miles from the Hebridean coast, we passed quite near to the Skeirinoe lightship. As we steamed on the prospect was grey in the extreme; the sky was overcast, there was a gentle swell on the sea, and the clouds hanging over the summits of Harris gave every indication of rain on the way. We were heading for Tarbert, and by now some details of the landscape could be picked out. On our starboard bow the fine peaks of Toddun and Sgoath Ard were lost in cloud; Loch Seaforth could be seen winding away into the hills, and right ahead was the island of Scalpay which lies in the entrance to East Loch Tarbert.

As we drew nearer the land was revealed as ridge upon ridge of purple brown moorland, with grey rain clouds hanging low on the hills; only the isle of Scalpay gave any colour to the scene, and even here the green hillocks were flecked golden brown in places with dying bracken. Of all the Tarberts on the west coast of Scotland, none lies on a narrower isthmus than this little village in Harris, for here the east and west lochs are not a mile apart. We entered East Loch Tarbert through the narrow Sound of Scalpay, and on our starboard beam the hills rose sheer from the sea.

The barrenness of these steep slopes is really extraordinary; from the water's edge, right up as high as one can see, there is bare rock and grass in about equal proportions—no fields, not a tree. But what grass there is provides good pasture and hardy sheep are bred in large numbers. I remembered that we were to make a call at Scalpay, and was wondering why, because as we came up the sound there was not a sign of human habitation. But then, as we passed abeam of the island, a little loch was revealed winding in among the low hills; we veered round and there inside was a cluster of single-storied cottages and a little stone pier. Scalpay is typical of many ports of call on this voyage; two passengers came aboard, some mails and provisions were landed, there was a brief lively conversation in Gaelic between the Captain and the pier folk, and we were off again. Half an hour later we were tying up at Tarbert. Even here there is not more than a score or so of houses, but nearly in every one are woven the tweeds that have made Harris famous. It was just noon when we arrived, and for half an hour the pier and its approaches were a scene of great animation.

From Tarbert we sailed southward close to the rocky shore. The scene is like nothing else in Britain. It is not the wild savage grandeur of Skye, still less the delicate beauty of the Firth of Clyde. Composed of the oldest known rock in the world, grey-pink archaean gneiss, the Hebrides have the beauty of profound solitude, of great wind-swept wastes of open moorland. Our next call was at Stockinish, a tiny place where the few grey cottages might well have passed unnoticed on the dun hillside. As we turned into the loch a rowing boat put out from the shore to take the provisions we had brought. All the time unloading was in progress and the little boat was tied alongside Captain Robertson was swinging the "*Lochmor*" round, so that the moment business was done we were ready to put straight out into the Minch again.

As we worked our way down the coast of Harris the view eastward across the sea was very fine. From whatever angle Skye is seen its mountains and capes assume some new fantastic shape, and now the headlands lying to the west of Dunvegan were superimposed like a collection of giant blocks set all a-skew to one another. Our last call in Harris was at Rodil, a scattered settlement at the south end of the island right under the shadow of Roneval. There is an ancient and picturesque church on the hillside here, that dates from the thirteenth century; it is the cathedral of the Outer Hebrides and is dedicated to St. Clement. The hills surrounding the little sea loch where we put in are rather greener than those farther north and in the shelter of one steep slope there were actually some trees! Again we put ashore a lot of provisions, and took on in exchange a large quantity of wool.



A provision boat putting out with bales of wool at Rodil, Harris. St. Clement's Church, the cathedral of the Outer Hebrides, is seen on the right.

Soon Harris was slipping away fast. The south end presents a majestic array of mountains, and to-day the shapely forms of Chaipaval, Maodal and Roneval were ringed with masses of grey cloud. The hills of North Uist were now looming larger, but between this island and the south end of Harris there is an extraordinary archipelago. On a map the Sound of Harris looks quite an open passage, but so thickly are the small islets clustered that it is only once or twice that one gets a glimpse right through to the Atlantic. Most of them are very low lying, but Pabbay has a fair sized cone, Beinn a' Charmain, that rises to 644 ft. So we came abreast of North Uist, and soon were entering Loch Maddy. *(To be continued.)*

Marvels of Tin Can Making

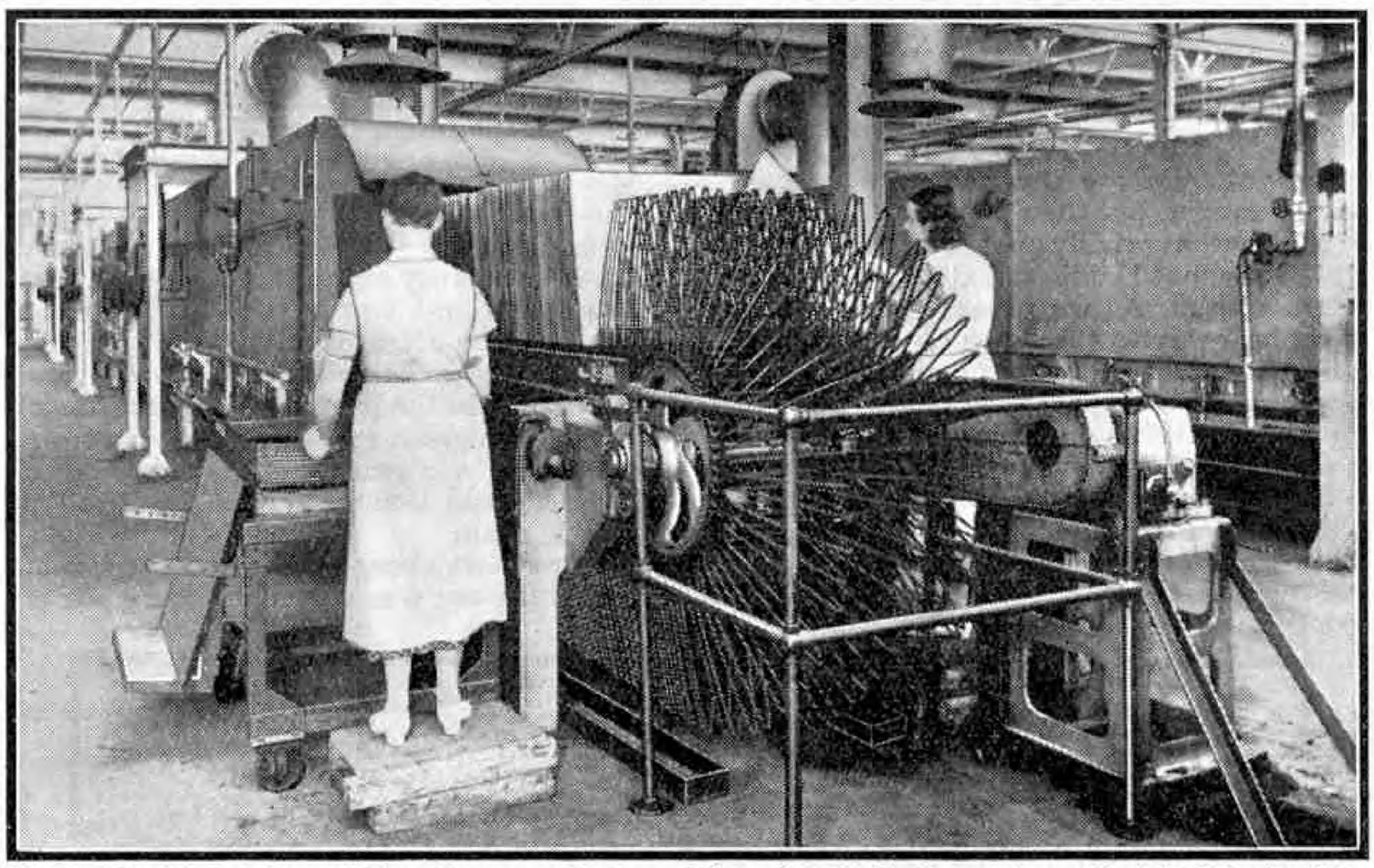
Machines that Produce 300 a Minute

By W. A. Bagley

YEARS ago canned food was regarded with suspicion, for housewives thought that the food was damaged in some way during the processes of canning. In addition the choice of canned foods was very limited, the most familiar varieties being condensed milk, pineapple chunks, and salmon. To-day, there is practically no limit to what can be canned, and tinned food often is preferred to fresh. There is no need to wonder whether anything is in season, for it can always be obtained in a can.

Apart from foodstuffs, there are literally thousands of polishes, paints, medicines and other commodities that are packed in tins, and the immense demand for tins for these and other purposes has led to the creation of a great industry, in which costly machinery of great complexity is used.

Tinplate, the raw material of the can maker, is thin sheet steel covered with a layer of tin of thickness about 0.00008 in., or about one fortieth the diameter of a human hair. The tin not only prevents the iron from rusting, but also gives the plate a bright appearance, enables it to be soldered, and makes it a safe material for food containers.



Sheets of tinplate being passed through an annealing oven. We are indebted to the courtesy of the Metal Box Co. Ltd. for this illustration and the lower one on the opposite page.

The steel from which tinplate is made is rolled into sheets by heavy rollers driven by powerful motors. It is rolled "hot" till it is about an eighth of an inch thick, and then rolled "cold" to its final thickness. The kneading action of the rollers is good for the metal, but care has to be taken to avoid excessive formation of iron oxide. Some is bound to be produced, however, and this is afterwards "pickled" off, that is, it is dissolved off in suitable acids. The sheets are annealed first, as the rolling makes them hard and somewhat brittle. This process is carried out by heating them in suitable ovens, and then allowing them to cool slowly.

In the meantime, the tin has been melted in a large cast-iron trough heated by gas. After the sheets of steel have been again pickled, they are fed through the molten tin and then passed through a bath of palm-oil. Various rollers feed the sheets in, whilst others regulate the thickness of the tin coating, and the process is almost entirely automatic.

The tinned sheets are next sent to the can makers. A usual size for these sheets is 20 in. by 28 in., but there is no real standard, since makers prefer to order sizes they find most economical to cut up. It is impossible to stamp out circular tops and bottoms without waste, but great ingenuity is used to minimise the amount of scrap produced.

Can making is one of the supreme examples of mass-production. The machines are arranged in lines so that the process is continuous, and the speed at which they work is amazing. It is indeed difficult to follow the swift progress of a can down the line. First the sheet is slit up into blanks for making the main body, and these are stacked in a magazine at the end of the line of machines. The blanks are next bent round a mandrel, and their edges are hooked and bumped into a tight seam, all at the rate of five a second. A wheel revolving in a bath of flux touches the line of cans, and solder from a horn or wheel completes the join. Sometimes the cans pass over a bath of molten solder so that the seams only touch. Surplus solder is wiped off with a buffing wheel, and a blast of cold air cools the cans. The bodies are taken along conveyor bands to a flanger, which is a device consisting of steel dies that open out the top and bottom of the body, and then to a closure machine, which drops previously stamped-out tops and bottoms into place. In this machine ingeniously designed rollers press the flanges over to make a perfect joint. No solder is used in sealing the can ends, and one machine end-seams about 175 cans a minute.

Next the cans are tested for air-tightness. This used to be done by submitting them to air pressure under water, when tell-tale bubbles indicated any leaks. At one time the cans actually were filled with water and left overnight, and the water level in any can the next morning showed whether it leaked or not. What a contrast to the latest method by which cans are accurately tested at the rate of five a second. The can is fitted into a chamber, and its open end is "gagged" with a rubber pad. Compressed air is forced in, and if any escapes, thus indicating a leak, the faulty can is automatically discharged.

Printing on the sides or ends of cans is carried out before they are made, that is, while the material of which

they are made is still in the flat sheet. It is possible to print any picture on tin plate that can similarly be printed on paper. The only difference is that paper is absorbent and tinplate is not. In tin printing each colour, therefore, has to be baked dry before the next is printed. The process is a lithographic one, the design being printed from rollers that run over the plate. If paper labels are needed, they are applied at the cannery after the cans have been packed.

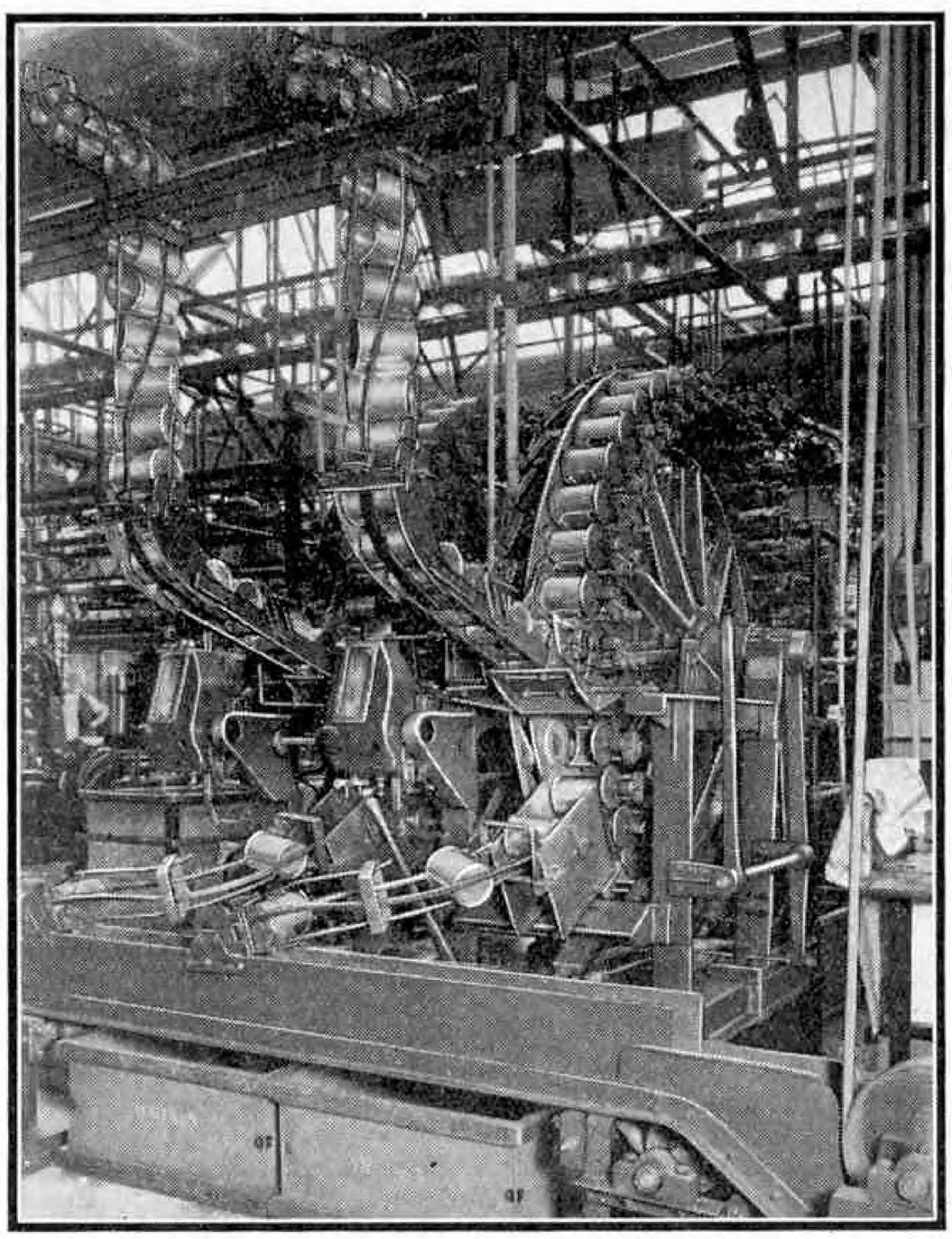
It is more difficult to make a tin that is rectangular or of irregular shape than to produce a round one. Machinery has been evolved that solves the problem, however. Some small tins, such as those used for polishes and pills, are stamped out. Others are spun. There is no one way of making tins, for so much depends on what they are wanted for, as well as on the machinery at the disposal of the makers. Unless millions of cans a year are required, it is better for a manufacturer to buy cans rather than to attempt to make them. A canner on a small scale is likely to be out of touch with new developments, and the complicated machinery is very costly.

Let us now visit, in imagination, the broad rich fields of Cambridgeshire and Lincolnshire, which are seamed with little railway lines that convey fruit and vegetables to the canneries, and there watch a typical operation, such as the canning of green peas. In order to retain their full flavour these must be canned within a few hours of picking. To pick them by hand would take days, so they are mown down like corn, and conveyed to a "viner" in which the pods are shelled by being thrown against a revolving rubber sheet. The peas are withdrawn by suction, whilst the haulm is used as manure.

A further operation cleans the peas of stalks and grades them. They are then "blanched" in fresh, hot water and automatically placed in the cans with a quantity of seasoning brine. Then follows cooking and quick cooling, the top is forced on, and the next we see of the can is on shelves and counters in shops and stores.



Cans being packed with fresh fruit before passing into exhaust boxes. Photograph by courtesy of Messrs. Baird, Walton and May, Barming, Kent.



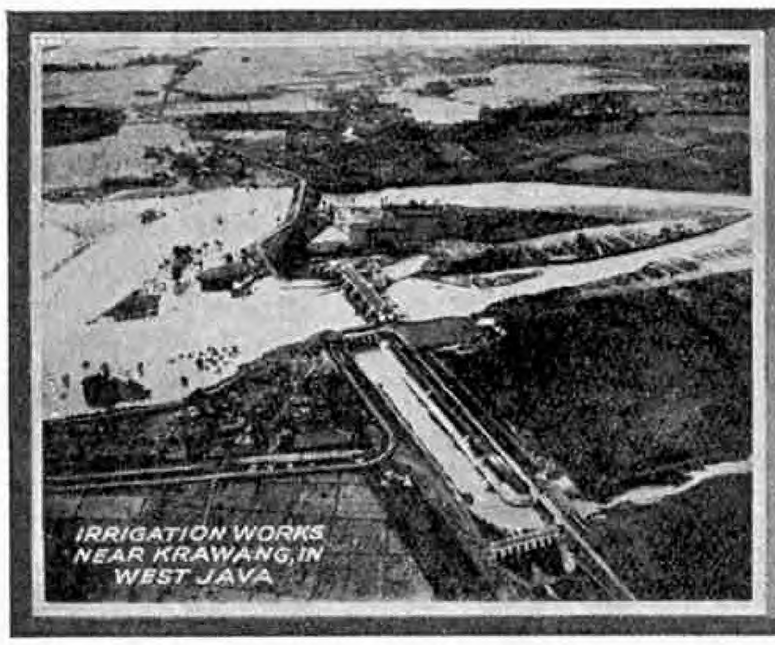
Cans being tested automatically for leaks by air pressure. Five cans are tested every second in this process.

Apples for canning are cored, peeled and sliced by machinery. Cherries are pitted by the same means. Pears are peeled by hand because of their shape. Tins made to contain fruit are coated inside with a gold varnish in order to counteract the effects of fruit acids. Others are lined with special paper. During the fruit and vegetable canning season in July the factories work day and night, turning out 250,000 tins of strawberries and 500,000 tins of peas daily. There is similar activity in other parts of England, for although in this country the trade is comparatively young, it is making tremendous headway.

Condensed milk was perhaps the first tinned food we ever knew. It was invented in 1856 in the United States by Gail Borden. At first, sugar was used as a preservative, but in 1890 evaporated or unsweetened milk was introduced. About 40 per cent. of the water, or roughly one sixth of the bulk of the milk, is removed by evaporating the milk in a vacuum pan. The milk boils at 140 deg. F. in the absence of air, so that it is little affected by the heat. It is then forced through holes one ten-thousandth of an inch in diameter at a pressure of 3,500 lb. per sq. in. This breaks up the globules of fat so that they do not rise as cream to the surface. The milk is poured into the tins while it is still hot, and there it is sealed and sterilised.

Milk cans differ from ordinary cans in that both ends are sealed in the machine, leaving a little hole through which the can is filled. The hole is closed with a blob of solder after the milk has been sterilised. This is an old method, but one which still survives. Very often the ordinary food can is used for milk canning.

So reliable is canned food that as an actual mathematical fact the chance of being poisoned by it is only one in several millions. Cans of food have been opened 20 years after being packed and the contents have then been found unimpaired. Many unusual things are canned in addition to foods, polishes and similar materials. For example, rose cuttings sprayed with paraffin wax and tinned can be sent long distances without injury.



ENGINEERING NEWS

A Safety Net to Protect Bridge Workers

A record for safe construction probably will be achieved on the £7,000,000 Golden Gate Bridge at San Francisco, which when completed will be the largest suspension bridge in the world. From the start of the work every effort has been made to protect the workers from accidents, with the result that the erection of the huge suspension towers, which rise from foundations 100 ft. below sea level to a height of 746 ft. above water, and the placing of the main cables and suspenders have been carried out without the loss of a single life.

Work is now proceeding on the actual bridge structure, and a great safety net has been spread under it in order to protect steel erectors and other workmen from injury in the event of a fall. The net is large enough to cover 16 football playing fields. Its actual area is 700,000 sq. ft. It cost £16,400, and is made of $\frac{3}{8}$ in. Manila ropes that are not tied together at the intersections, as is usual with small nets, but are held together by special metal clamps, over 3,000,000 of which were required.

The mesh of the net is large enough to permit hot rivets to fall through, but to prevent these and other hot materials from setting the net afire, the strands of the rope of which it is composed were fireproofed with suitable chemicals during the manufacturing process.

Giant Transformer for Australia

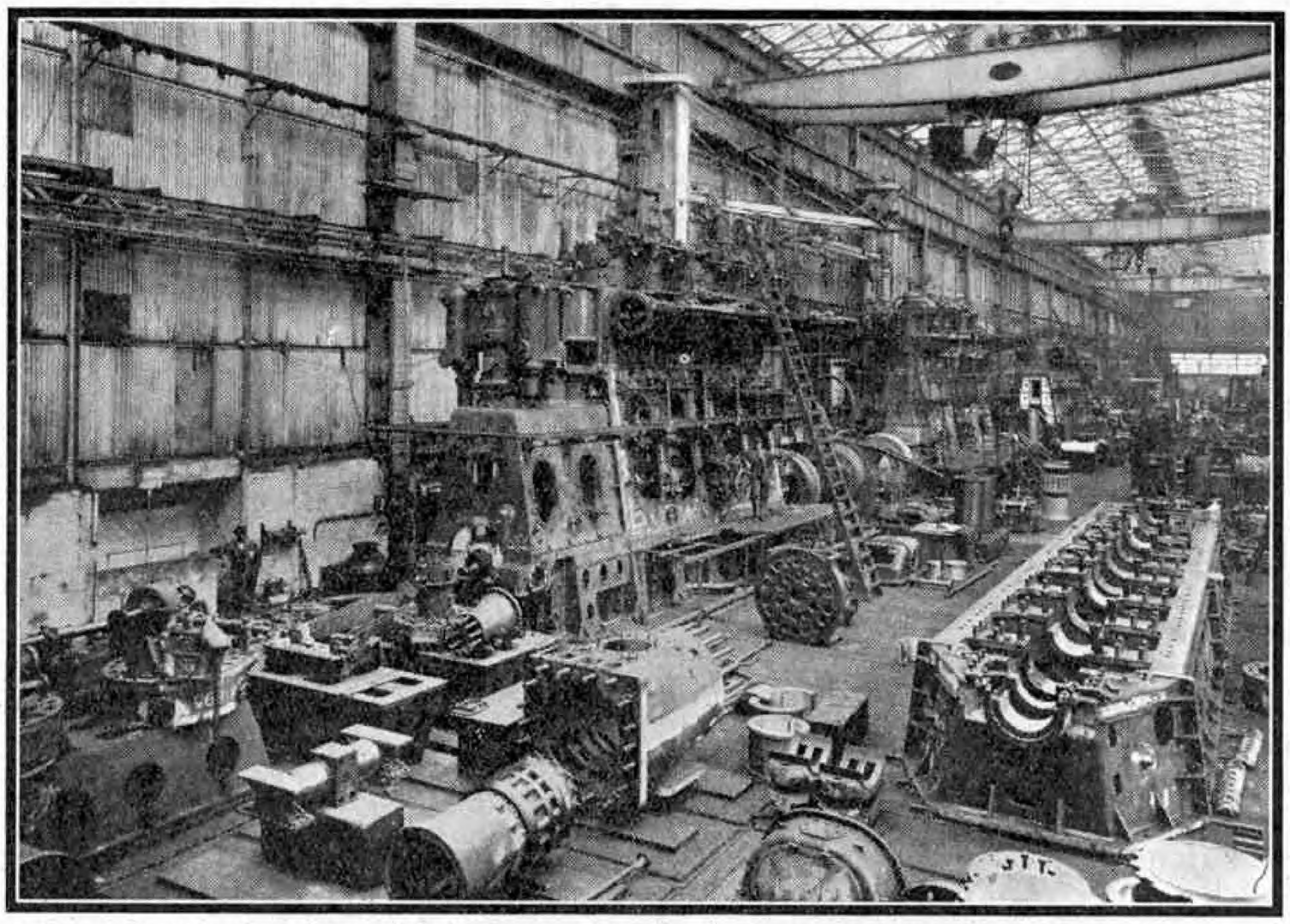
One of the largest transformers ever exported to Australia was shipped to Melbourne recently. It is a 28,000-kVA Hackbridge three-phase unit designed to step up from 11 kV to 132 kV, and has been built for service at the Yallourn power station of the State Electricity Commission of Victoria, New South Wales. Complete with coolers and auxiliary equipment the transformer weighs over 40 tons, and was shipped sealed and filled with dry air under pressure. When the transformer is in operation it will be kept cool by oil circulated through a water cooler of special design.

Reclaiming Land from the Sea in Tokio Bay

An important land reclamation scheme, the object of which is to convert a portion of the sea frontage in Tokio Bay into a great industrial area, has been prepared by the Engineering Department of the Japanese Home Office, and work is to begin in the near future.

The primary object of the scheme is the reclamation of land suitable for building development, but it includes also the dredging of a new deep-water channel between Yokohama and Tokio, and the construction of a sea wall, $8\frac{3}{4}$ miles long and roughly about a mile from the shore. This wall will follow the contour of the shallow muddy coast from Singagawa, on the outskirts of Tokio, to Kawaski, half-way to Yokohama, and within it a channel, 770 yds. wide and 23 ft. deep at low water, will be dredged.

The creation of this channel will drain a vast expanse of foreshore, in which other channels will be formed to make 10 "islands," comprising a total area of about 20,000,000 sq. yds., which will be developed as factory sites. The channels will enable cargo ships to dock beside the reclaimed land areas. This ambitious scheme, work on which will commence sometime this year, is estimated to cost about £4,000,000.



A fine photograph of marine engines in course of erection in the erecting shop of The Wallsend Slipway and Engineering Co. Ltd., Wallsend. This photograph is reproduced by permission of the Company.

New Mercury-Vapour Lamp

A new lamp that is a development of the mercury electric discharge lamp at present used for street lighting, and to some extent in factories, has been perfected as the result of research undertaken by members of the Electric Lamp Manufacturers' Association. The new lamp looks very much like an ordinary household lamp, but the light is given out not by the usual tungsten filament, but by mercury vapour through which an electric discharge is passed. The source of the light is in the form of a small tube about $\frac{1}{4}$ in. diameter and $\frac{3}{4}$ in. long. The lamp has a three pin bayonet cap, the third pin of which prevents it being accidently fitted into lampholders designed for ordinary incandescent lamps. The new lamps are designed to work off the ordinary 230-volt supply, but they require a small choke wired in series. The lamps will be available in 80 and 125 watt sizes, and are expected to become very popular for industrial illumination.

Boring a Mine Shaft Through Rock

A shaft 5 ft. in diameter and 1,125 ft. deep has been bored at the Idaho-Maryland mine in California by means of specially designed drilling equipment. This consists essentially of a cylindrical cabin 5 ft. in diameter and about 10 ft. high suspended from a cable, and anchored securely in the hole by means of six jack screws placed around its circumference. Through this chamber passes a vertical splined shaft, driven from a 40 h.p. motor by a chain and bevel gears. Attached to the end of the shaft is a barrel 5 ft. in diameter and 15 ft. long, and to this is riveted a cutting ring or shoe.

With this device boring was carried out at a rate varying from 85 ft. to 148 ft. per month, the material being removed in cores 7 ft. in length and weighing about 11 tons. The drilling crew consisted of a drill operator housed in the cabin and protected by a steel roof from falling rocks, and a helper on the surface, whose job it was to attend to the cable hoist.

A Famous Bridge to be Reconstructed

A decision has at last been reached regarding the future of the famous suspension bridge, built by Thomas Telford, the great engineer, that spans the Menai Straits between the mainland of North Wales and the island of Anglesey. After many years of splendid service the bridge has been found unsuitable to bear the burden of modern traffic. It was at first proposed that the bridge should be demolished and a new one built on the same site, but after careful consideration it has been decided to reconstruct and strengthen the old structure. The scheme will cost nearly £228,000 and owing to the peculiar difficulties that are likely to be encountered, and the fact that it will be necessary to keep the bridge open for traffic during the whole period of reconstruction, the work is expected to occupy four years.

At present the bridge is supported by 16 wrought-iron chains, and one of the engineers' main tasks will be to replace these with four chains made of high tensile steel. The reduction in the number of chains will appreciably reduce wind pressure on the bridge. This is a point of great importance for the narrow strait acts as a wind funnel and winds of more than 100 m.p.h. may have to be faced.

The carriageways are to be increased in width from nine to ten feet, and in place of the present narrow footpath two, five feet in width are to be provided. The masonry of the bridge will remain substantially as it is now, but the entrance archways at each end are to be enlarged, and the towers supporting the suspension chains considerably strengthened.

Silent Tramcars for New York

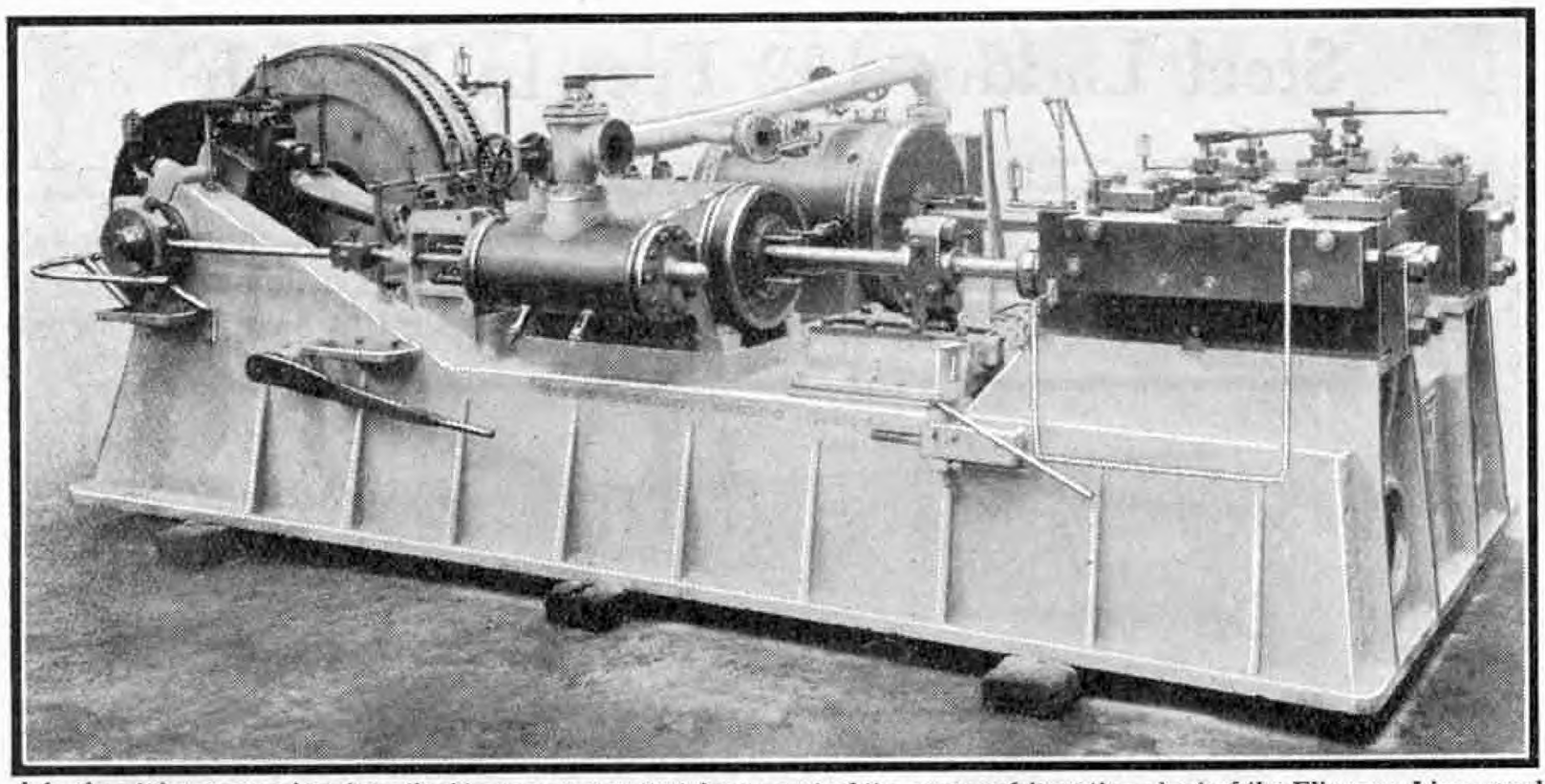
Tramcars that are silent in operation and incorporate other interesting features have been placed on service recently by the Brooklyn and Queens Transit Corporation, New York. Silent running is effected by the use of rubber in the bogies and wheels. Improved acceleration and deceleration are obtained by means of a special controller, and it is claimed that in five seconds from starting a speed of 24 m.p.h. can be attained. Braking of an improved pattern is provided and this is capable of bringing the car to a standstill from a travelling speed of 24 m.p.h., within a distance of 70 ft. Actually three different brake systems are used, and these are put into operation in sequence by pressure on a single foot pedal. A dynamic brake acts on the motors, a magnetic brake on the track and pneumatic brakes on the wheels. This combination pulls up the car smoothly without any discomfort to the passengers, irrespective of the condition of the track. The electric equipment of the new vehicles was made by the General Electric Co. of New York.

Giant Factory for making Synthetic Rubber

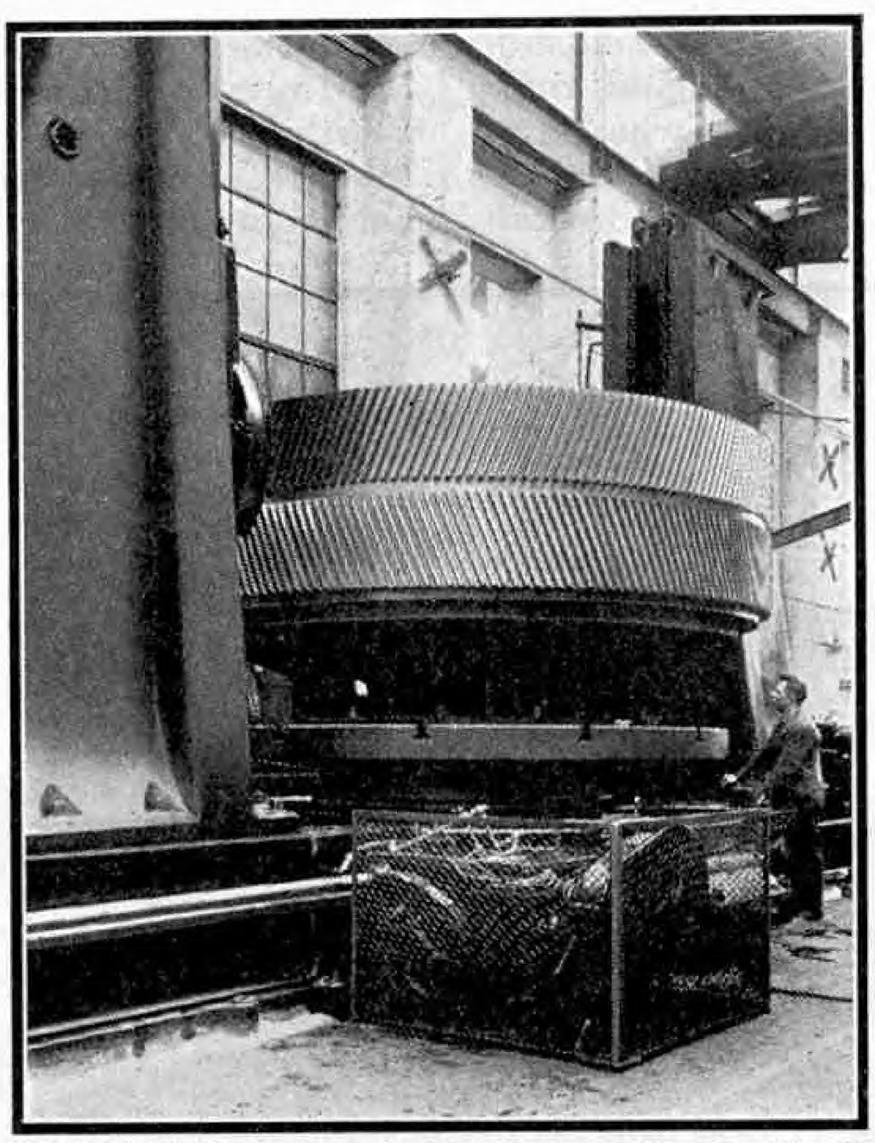
There is a possibility that all Germany's motor vehicles will in a few years be fitted with tyres made from synthetic rubber. The manufacture of this material, which is known as buna, has been carried out on a small scale for some time, and it is claimed that tyres made from it have a longer life and stand up to rough usage better than tyres of natural rubber.

Now work has been started on the construction of a giant factory for making buna in colossal quantities. The factory is being erected at Merseburg in Saxony and it is so large that it will not be completed and in operation before 1938. It is hoped that the output from this plant will make Germany independent of supplies of natural rubber.

Unfortunately buna tyres are more expensive than those made from natural rubber, but it is hoped to reduce their cost by finding uses for the by-products.



A horizontal compound carbon dioxide compressor that forms part of the cargo refrigerating plant of the Ellerman Line vessel S.S. "City of Manchester." The plant is capable of dealing with an insulated capacity of 150,000 cu. ft. Photograph by courtesy of The Liverpool Refrigeration Co. Ltd., Sankey, near Warrington.



Cutting the teeth of a large double helical gear. The wheel has an overall width of 38½ in. and has 217 teeth. Photograph courtesy of David Brown and Sons (Hudd) Ltd.

Conveyor Belt Weighing Over 17 Tons

An enormous rubber conveyor belt that weighs over 17 tons and is 2,200 ft. in length has been set to work at a coal loading plant in Bluff, Durban. The new belt replaced a worn one that had been in service for 10 years, and is capable of loading about 600 tons of coal an hour.

Most of the ships calling at Durban for coal are loaded by means of the conveyor, and the new belt is the third to be fitted since the plant was erected in 1918. During the life of the last belt over 6,000,000 tons were conveyed from shore to ships' holds and bunkers.

The giant belt was made in Durban by the Dunlop Rubber Company of South Africa.

A Forward-Controlled Fire Engine

An enclosed fire engine that looks rather like a large streamlined van, and is fitted with forward control, has been made by Leyland Motors Ltd., for the Ilford Fire Brigade. It is the first forward-controlled fire engine to be built, and incorporates a short wheel base chassis that allows easy movement in confined spaces.

The driver, chief officer, and a crew of 12 men are all accommodated under cover, and preparations for fighting a fire can be made on the journey to it. The pumping equipment is capable of delivering over 750 gallons of water per minute.

A Souvenir from the Bed of the River Columbia

For the benefit of engineers of the future who may want to know on what sort of foundation the Grand Coulee Dam in the United States of America rests, a 3 ft. block of granite that was extracted from the bedrock, 60 ft. beneath the base of the dam, has been preserved at the State College of Washington. The block was extracted in the course of investigations of the dam site by the contractors before the dam was built, and will have a permanent place in the college grounds.

Spanning the Golden Horn

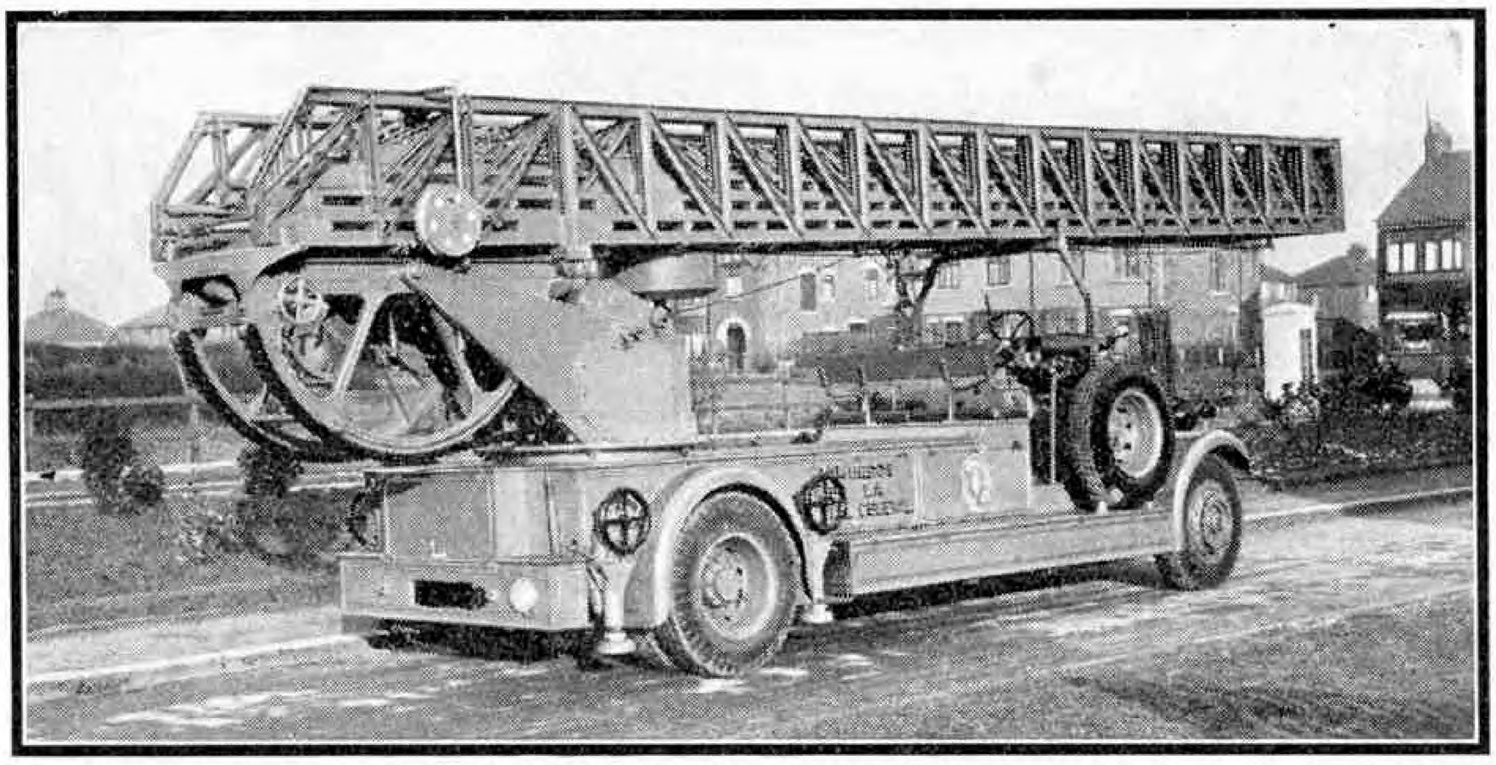
Work has started on a new floating bridge that is to span the famous Golden Horn, the harbour of Istanbul, Turkey. The bridge will be one of the most up-to-date in the Near East, and the money required for its construction has been raised by levying a toll of 1/11th of a penny a head on the people. The new structure will be known as the "Ataturk Bridge," and will be supported by 24 pontoons. It will have a total length of over a third of a mile, and will accommodate double tramway lines and very wide pavements for pedestrians. It is expected that the bridge will be ready for service in 1938.

A Modern Fire Escape

Steel Ladder 132 Feet in Length

THERE are few greater thrills than the sight of a modern fire engine speeding on its way to a fire. All traffic is halted at the sound of its clanging bell and as far as possible it is given a clear run to the scene of the fire in order that there shall be no delay in beginning the fight with the flames.

Modern fire engines and appliances are wonderfully efficient in comparison with those of 20 to 30 years ago. The coming of the motor car has been responsible for great changes. Motor fire engines are far speedier than the old-fashioned horse drawn vehicles, and also are larger and can carry more men and equipment. In addition they have powerful engines that can be used for driving the pumps employed, which are more effective than the steam driven pumps of former times as well as more convenient to bring into action and control.



A Leyland fire escape built for the Buenos Aires Fire Brigade. The escape is equipped with a pump that can deliver 500 gallons of water a minute. The illustrations to this article are reproduced by courtesy of Leyland Motors Ltd.

The standard pumps of the Leyland range of fire engines deliver 500 and 700 gallons per minute respectively at a pressure of 125 lb. per sq. in. They are compact and light in weight, and are made of gun metal with stainless steel driving shafts, so that sea water and water containing corrosive acids can be used without ill effects.

It is not always realised that it is difficult to hold the nozzle of a hose delivering water at the high pressures employed in fire-fighting, and to direct the jet effectively to where it is most needed. The explanation will be found by a few trials with an ordinary garden hose. If a length of this connected to a tap is laid on the ground, turning on the water suddenly causes the nozzle to go backward. When the tap is turned fully on, so that the water pressure in the hose is increased, the nozzle reacts more violently and the hose writhes about like a serpent, shooting water unexpectedly in various directions. The nozzle must be held firmly in order to overcome jet reaction causing this.



When the ladder is to be raised and extended, jacks on outriggers are lowered in order to give stability to the escape.

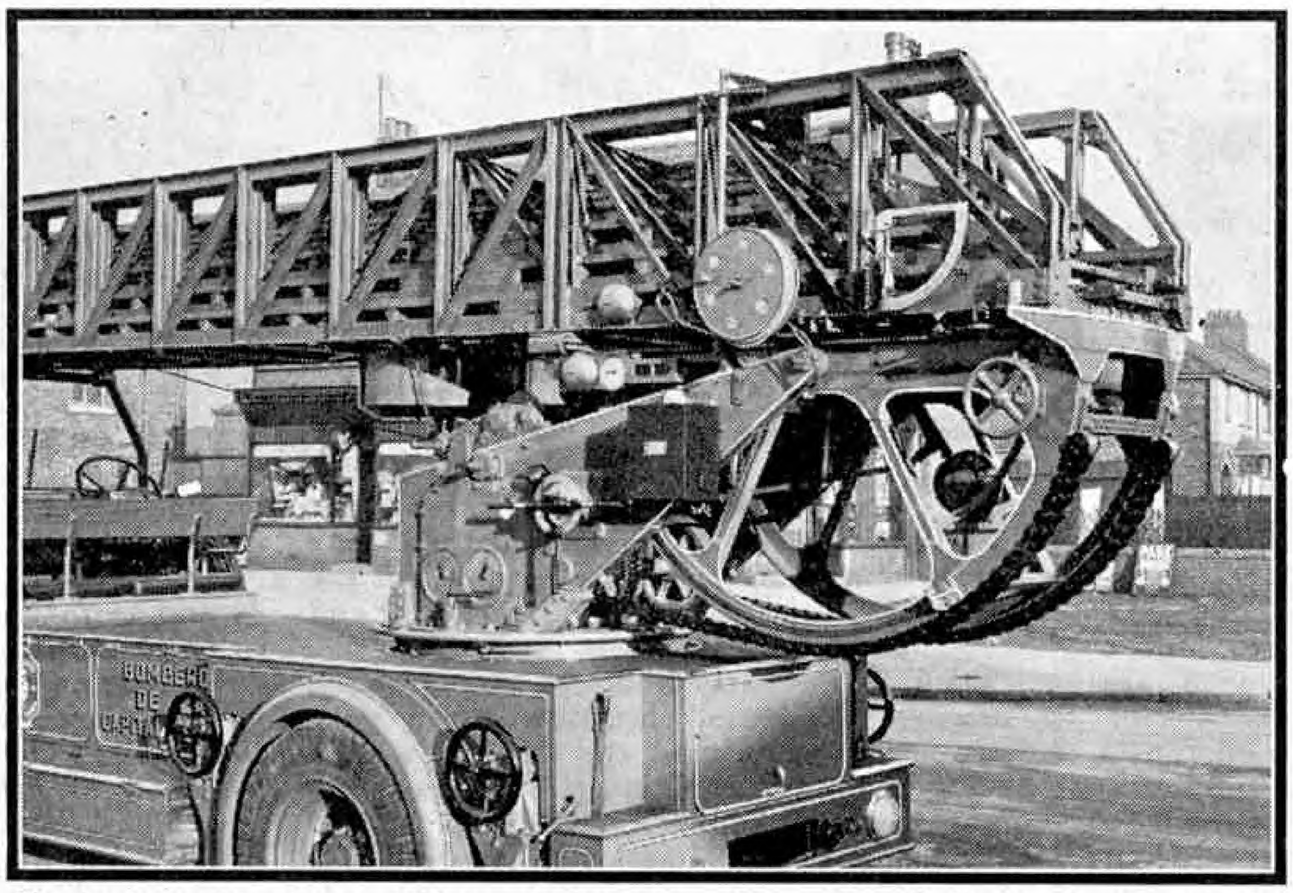
The reaction of a fire-fighting nozzle may be so great that more than one fireman may be required to hold it. On a large nozzle the backward thrust may be considerably more than 100 lb. This would soon exhaust the strongest of firemen, and is avoided by fastening the nozzles to something rigid on the ground or to a portable bracket. The nozzles also can be fastened to escape ladders, and indeed often have to be used in such positions in order to pour water downward into a burning building. The jet reaction from the nozzle then gives rise to considerable leverage and widespread rigid supports are provided for the escape platform or turntable on which the ladder is supported. With small escapes the tendency to sway is overcome by the use of hinged props fastened to the ladder at heights of about 16 ft., and spread out with their feet as far apart as possible. Large escapes have the bases of their chassis increased by means of steel beams or outriggers, supported rigidly by screw jacks. The weight of the vehicle then is transferred from the springs and wheels and borne by the ground through the jacks.

The escape illustrated on this and the opposite page is an excellent example of a modern fire-fighting appliance of this kind. It is of the Leyland-Metz type, and was built for use in Buenos Aires, in Argentina. It is mounted on a Leyland chassis, which has a six-cylinder engine of 49.8 h.p., R.A.C. rating, but actually developing 115 brake horse power.

The Metz design of ladder employed has many advantages. Each section is built in box form of angle and channel sections so that it is open and easily inspected, while offering little resistance to the wind, an important feature of a ladder that can be raised to great heights without supports for its upper end. The ladder is in five sections and can be extended to a total length of 132 ft., but similar ladders can be constructed with total

lengths of from 60 ft. to 164 ft. It is made of steel, a form of construction that the makers particularly recommend for ladders of 100 ft. or more.

The ladder is provided with several movements, and the drive for these is taken from the main gear box through shafts and reduction gearing to bevel gears at the base of the turntable. This drives the gears for the various operations, and these are put in motion by means of hydraulic clutches, the necessary pressure being supplied by a rotary oil pump, also driven from the engine.



The turntable of the ladder. All the controls are grouped near it, and indicators show the operator the position and slope of the ladder, and tell him how far it is extended.

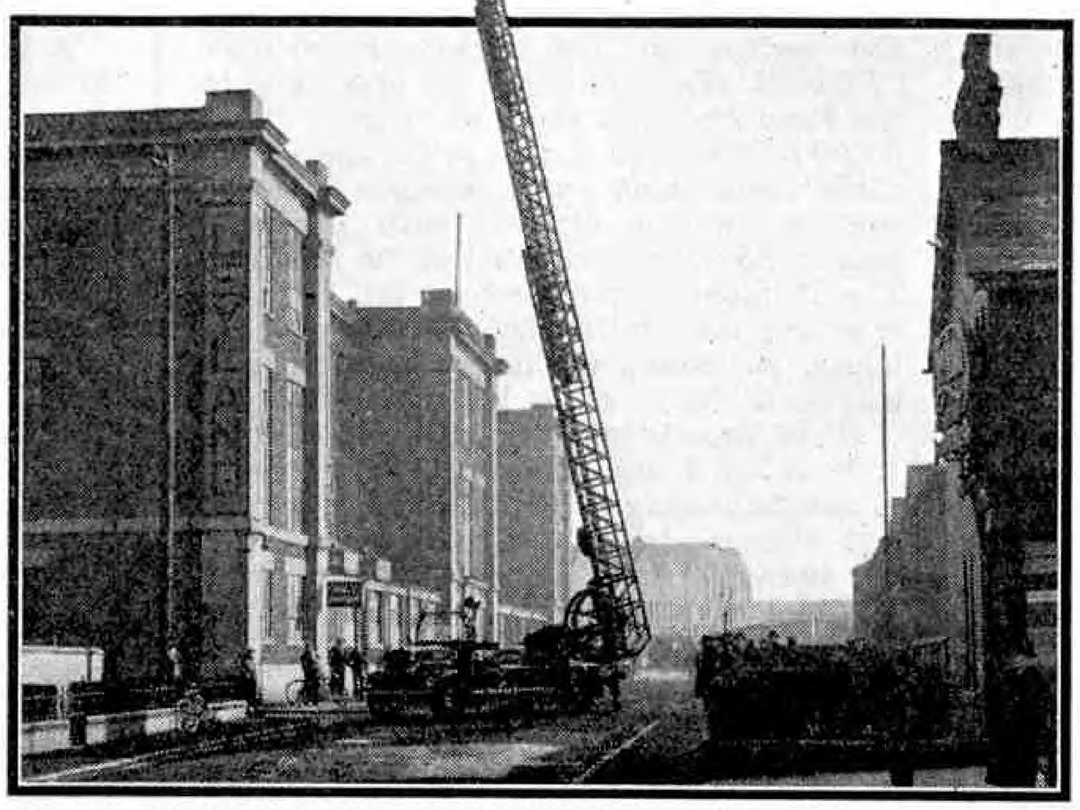
All the controls are grouped together at the base of the escape, and the speed of the engine also can be varied as desired from this point. As the various levers are moved, the ladder is extended or contracted, swung round on its turntable, and varied in slope in order to suit the conditions in which it is required to work. Its exact position is always known to the operator, for this is registered continuously on three dials and two indicators in front of him.

On one dial is a pointer showing the stresses introduced by the weight of men and equipment on the ladder, the wind pressure and the jet reaction. This pointer travels between the zero mark and the safety limit, keeping the operator constantly informed of the conditions. It even takes into account irregularities of the ground, automatically governing the length of ladder that can be allowed at any angle of elevation. In addition the indicator shows whether more men or additional hose can be allowed on the ladder. At night illuminated coloured arrows give these indications, in conjunction with an electric bell that warns the operator when the highest loads that can be allowed are being approached or have been reached.

Safety measures are fitted on a generous scale, so that nothing can go wrong during operation. One operator can exercise complete control, and it is impossible for him to carry out movements in the wrong order, for all the controls are automatically interlocked. The safety limits for the extension of the ladder at any slope are not only shown on one of the dials, but are enforced by the automatic stoppage of the mechanism, and the ladder can only be extended beyond these limits by the deliberate manipulation of a patent trip catch. Automatic stopping gear also brings the ladder to rest when it strikes any obstacle while it is being raised, extended or turned round. No damage therefore can be done by accident of this kind, even at night, when it may be difficult to see the top of the ladder. A special device keeps the escape upright, however uneven the ground on which the vehicle stands may be. The rear road springs of the vehicle are locked before the ladder is brought into use, in order to make sure that the escape is perfectly rigid, and the four powerful and quickly operated screw jacks that are fitted give a firm foundation.

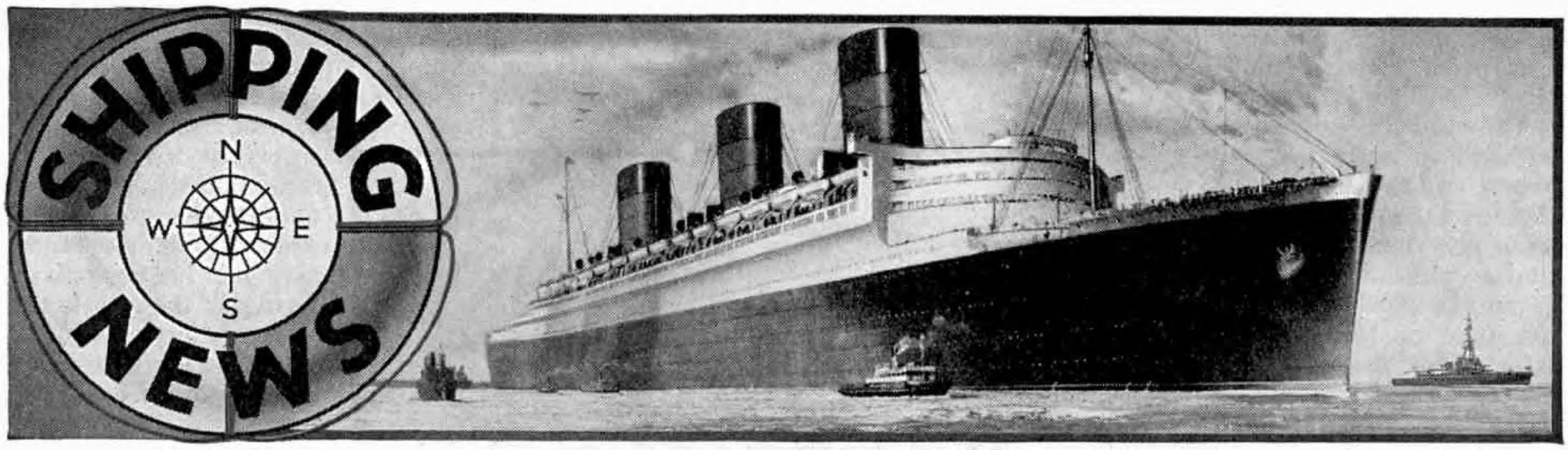
All the operations of the ladder can be carried out by hand if this course becomes necessary. Other interesting features are that the steel ladders are double trussed, so that they can be leaned safely against buildings, or even used for bridging purposes. Their rungs are covered with wood in order to give a good foothold. A lifeline and a searchlight are included, and a telephone is fitted, so that the fireman on the top of the ladder, with the nozzle of the hose extending over its end in his charge, can give information to the operator in charge, who is then able to move him to the most suitable position for the work he has to carry out.

The escape shown in our illustrations also accommodates a pump that can deliver 500 gallons of water a minute at a pressure of 125 lb. per sq. in. This is of the two-stage turbine type and, as with the 500 gallon and 700 gallon pumps already referred to, is made of gun metal throughout with the exception of the main spindle, which is of stainless steel. The drive is from the gear box of the chassis, and the controls are so arranged that one man can exercise complete control. A suction hose 5 in. in diameter and fitted with screw couplings and a strainer is provided in order that water can be pumped from a pond or dock instead of from the mains, or in addition to the normal supply. Powerful pumps can force the water to a height of 160 ft.



The ladder extended to its full length. It is in five sections with a total length of 132 ft., but similar escapes may have ladders up to 160 ft. long.

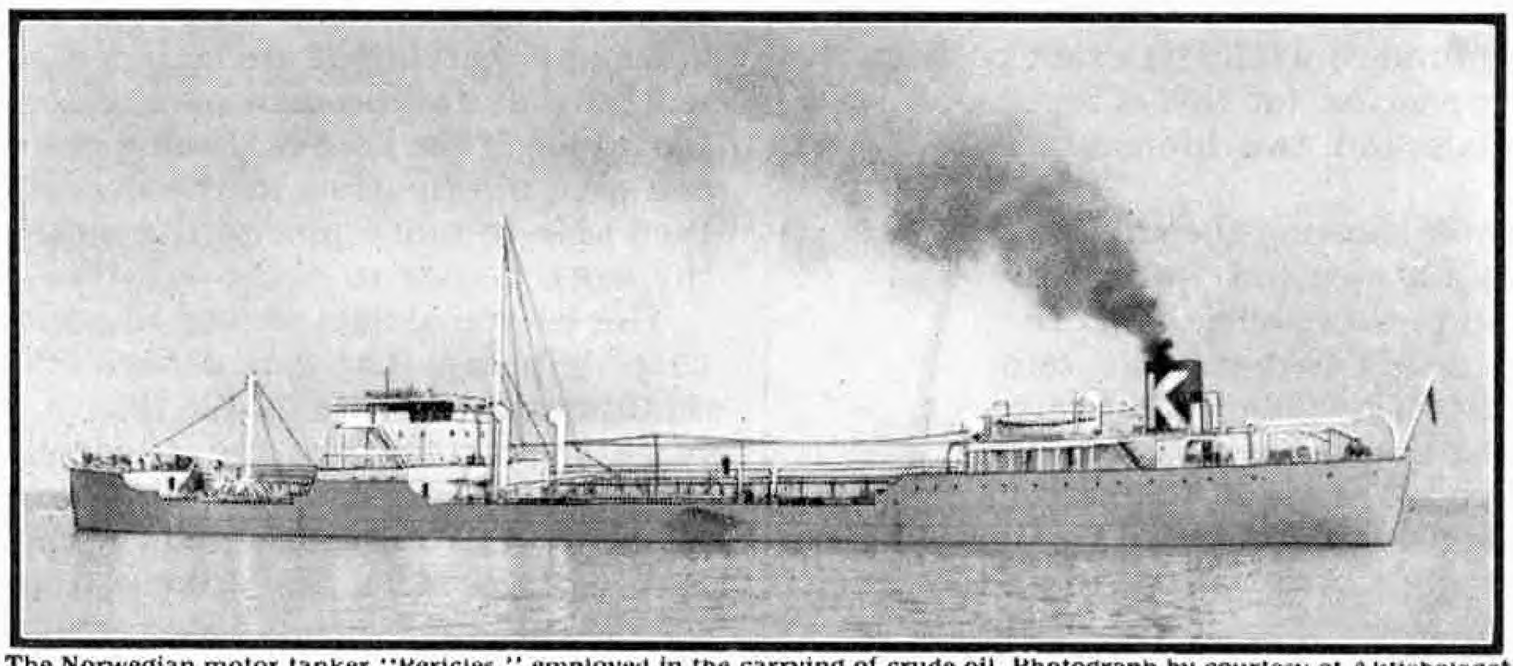
To-day there is a tendency to erect larger buildings in the busy central areas of our great cities, and to crowd into them more occupants, thus increasing the danger that would follow an outbreak of fire. For this reason escapes are being constructed with longer ladders. An even longer escape of the Leyland-Metz type than the one we have described was constructed last year for the Hull City Police Fire Brigade. The ladder is 150 ft. in length when fully extended. It is of record height for the British Empire, and possibly is the longest in the world.



Norway's Tanker Fleet

Norway's tanker fleet constitutes about one-third of that country's total tonnage, and includes many of the most modern motor tankers afloat. These vessels are employed for carrying various spirits, acids and other fluids as well as oil. Their services are in great demand for supplying fuel for the many motor ships owned by Norwegian companies, since about one half of the tonnage of that country in 1936 consisted of vessels driven by Diesel engines.

A recent addition to the tanker fleet is the motor vessel *"Pericles,"* illustrated on this page. The *"Pericles"* was built by Aktiebolaget Götaverken, Göteborg, Sweden, and delivered last year to her owners, D/S A/S Eikland, of Oslo. The overall length of the vessel is 481 ft. 5½ in., the beam is 59 ft., and the draft is 27 ft. 11 in. The oil engines installed have an initial horse-power of 4,300, with a fuel consumption of 14½ tons a day. The vessel has a designed speed of 12 knots, a single screw being fitted. The *"Pericles"* is employed in carrying crude or unrefined oil.



The Norwegian motor tanker "Pericles," employed in the carrying of crude oil. Photograph by courtesy of Aktiebolaget Götaverken, of Göteborg, Sweden, the builders of the vessel.

Life-Boat Rescues in 1937

The early months of 1937 have proved busier for the fleet of the Royal National Life-Boat Institution than for a number of years. During January there were 64 launches of life-boats to vessels in distress, averaging more than two launches a day. It was the busiest January since 1913, when the launches numbered 67, and the number of lives rescued was 71.

Conditions at sea were better in February, and there were only 27 launches, 11 lives being rescued. Life-boats helped, escorted or stood by 16 boats and vessels. During January and February the Royal National Life-boat Institution made awards amounting to £2,119 for services, compensation for injuries and payments to the dependents of life-boatmen who have lost their lives.

Outstanding among recent services was the work of the Torbay, Devon, life-boat crew who rescued 52 men from the 4,000-ton London steamer *"English Trader."* This vessel went ashore in a rough sea early one morning at the entrance to Dartmouth. The Torbay motor life-boat *"George Shee"* went out to her help. She stood by all day while vain efforts were made to refloat the steamer, and after refuelling, returned and remained for the night.

During the early hours of the morning, however, the wind increased to a gale, with heavy seas, and the steamer was in great danger of breaking up. It was therefore decided to abandon the ship. and at six o'clock the life-boat went alongside to take off the crew. It was a hazardous attempt, carried out in darkness among rocks, with seas sweeping high over the steamer. The life-boat finally manœuvred under her stern, a rope ladder was let down, and in 15 minutes the crew of 52 had been transferred to the life-boat. She brought them safely ashore, having been out over 30 hours.

The Institution has received a gift from the owners of the Hamburg steamer *"Edmond Hugo Stinnes"* in gratitude to the Humber motor life-boat *"City of Bradford II."* On 29th January, during a gale, the steamer sent out a wireless message that she was in distress, with a broken rudder, 35 miles north-east of the Humber. The Humber motor life-boat put out and searched for her in the gale for over 12 hours, but found nothing, as the steamer had been able to go on her way.

It is interesting to find that during 1936 R.N.L.I. life-boats helped 30 foreign vessels belonging to 14 different countries, and rescued from them no fewer than 161 lives. Of these 30 vessels, seven were French, and 52 French lives were saved.

Veteran Forth Ferry Steamer Passes

The ferry steamer *"William Muir,"* which has plied across the Firth of Forth between Granton and Burntisland for more than half a century, was recently taken out of commission. This veteran, which was the subject of an article in the August 1936 *"M.M.,"* was built at Kinghorn in 1879, and has been in the Granton and Burntisland ferry service continuously since that time, except for two years' duty as a mine sweeper during the Great War. Her place has been taken by the *"Snowdrop,"* which has been re-named *"The Thane of Fife."*

The *"Snowdrop"* was until recently employed in the passenger ferry service on the Mersey between Liverpool and Wallasey. She is a twin-screw steamer with a length of 152 ft., and was built in 1910 by Cammell Laird & Co., at Birkenhead. Alterations have been made to the *"Snowdrop"* to enable her to carry vehicular traffic as well as passengers, and her hull also has been strengthened to enable her to withstand the more exposed conditions with which she will be faced in the North.

The vessel had an exciting passage in exceptionally stormy weather on her way round the North of Scotland to her new quarters. She was in charge of the tug *"Warrior,"* but she became detached near Cape Wrath, and for two days was adrift with no one on board and without lights. She was finally resighted by the *"Warrior"* and again taken in tow.

Swimming Bath in Training Ship

A new swimming bath recently built in the training ship *"Warspite"* is probably the only freshwater bath afloat with a full equipment of filtering, chlorinating and aerating apparatus. It is unusual also in being constructed of concrete in the hull of a vessel.

The *"Warspite"* is the training ship of the Marine Society, and was formerly the light cruiser H.M.S. *"Hermione,"* a 4,360-ton vessel built in 1893. She has a length of 320 ft., and a breadth of 49½ ft., with an armoured deck 2 in. thick. The vessel was purchased in 1920 and was cleared of her machinery. The bath has been installed in what was formerly the forward boiler room. It is 35 ft. long and about 30 ft. wide, with a maximum depth of 6½ ft. A complete turn-over of 324,000 gallons of water takes place in the bath every six hours. The side top bunkers have been transformed into dressing rooms, with showers, and into drying rooms.

American Diesel-Engined Trawlers

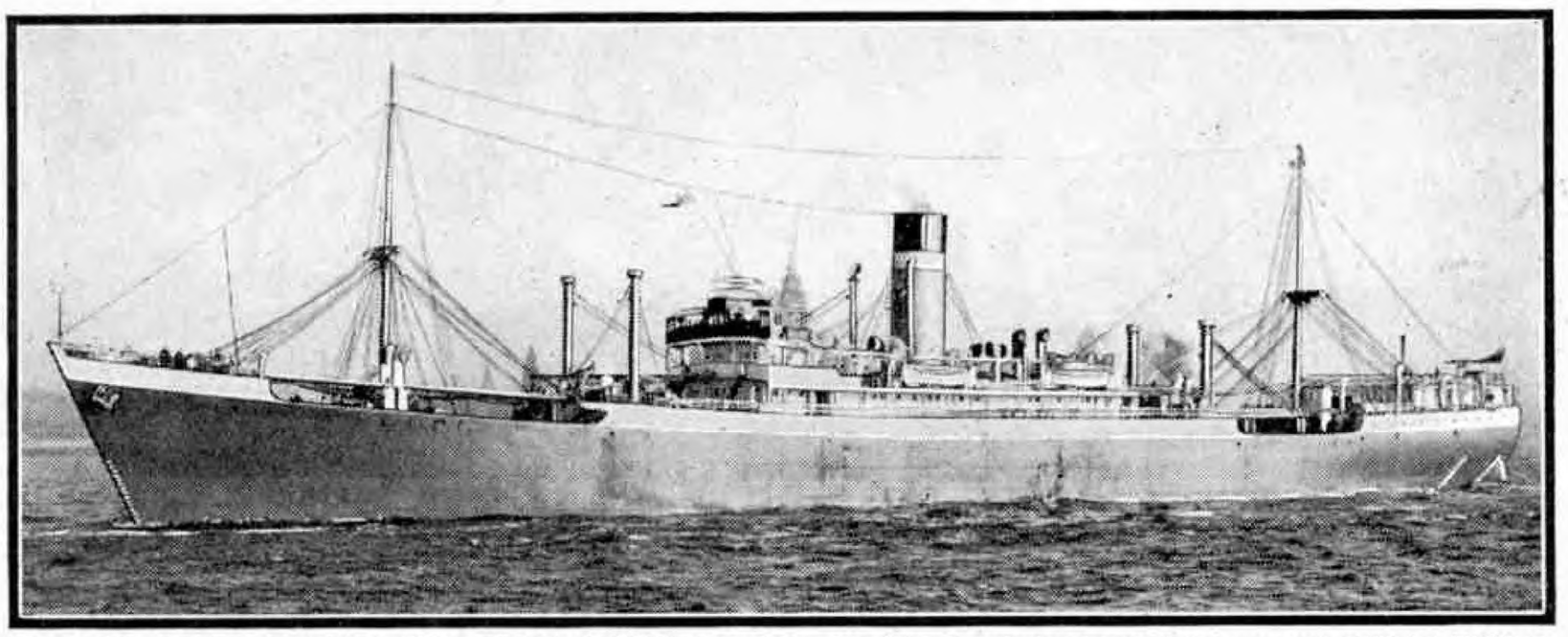
Several departures from normal practice have been made in the construction of three new Diesel-engined trawlers, the *"Storm," "Surf"* and *"Swell,"* recently built in the United States. In appearance, size and equipment these vessels are in striking contrast to the Grimsby type of trawler in use in British waters.

The new trawlers each have an overall length of 144 ft. 8½ in., a beam of 25 ft. and a depth of 13½ ft. Their hulls are of a special design that enables them to be driven easily through heavy seas, and prevents the vessels from being "down by the head" when returning loaded from the banks. The hull plates are twice as heavy as those used in naval vessels, in order to withstand the buffeting of winter seas. The stems have a pronounced forward rake, and the lines immediately aft are unusually fine to permit easy entrance into the water. The underwater lines aft are of the cruiser stern type. Longer fishing in bad weather and quicker runs to the market are possible with these new vessels.

The main machinery consists of solid-injection McIntosh Diesel engines capable of developing 600 h.p. at 180 revolutions per minute. The fish hold is lined with pure nickel, and a special air-cooling equipment maintains a temperature slightly above freezing point, so that fish can be carried during the summer months without fear of loss.

The installation of this new refrigerating system is considered to be the greatest improvement in the vessels. Between the hull plates and the inner shell of the hold there is a lining of cork 3 in. thick through which air ducts run vertically. Dry, cold air is thus circulated to keep the hold at a temperature between 33 and 36 deg. F. This temperature, in turn, controls the rate of melting of the ice in the hold, and makes it possible to reduce the load of ice carried from 60 tons to 20 tons. This factor alone increases the average hold capacity by 100,000 lb., raising it to 400,000 lb.

Showers and washrooms are provided for the use of the crew. Other comforts are to be found in improved quarters for the officers and crew, and drying rooms for wet clothes.



The turbine-driven cargo liner "City of Agra," 6,361 tons gross, the largest merchant vessel built during 1936 by William Denny and Bros. Ltd., at Dumbarton. The vessel is owned by the Ellerman Lines Ltd. The photographs on this page are by B. and A. Fielden, Blundellsands, Liverpool 23.

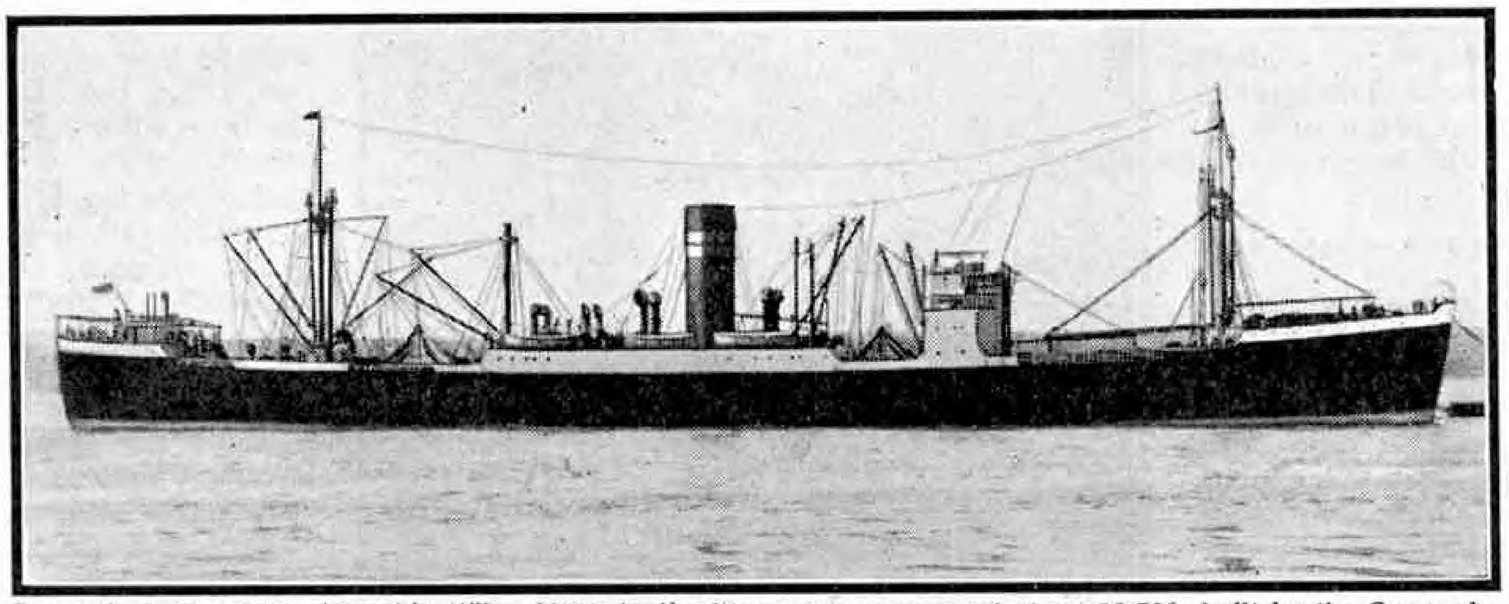
New R.N.L.I. Motor Life-Boats

The Royal National Life-boat Institution has laid down eight more motor life-boats, three of which are to be stationed in Scotland, two in England, two in Ireland and one in Wales. One of the three boats for Scotland is for a new station that the Institution has decided to establish at Tobermory, in the island of Mull. The three boats for Scottish stations are being built on the Clyde and the other five at Cowes, and all are to be completed by the end of the year.

Five of the new life-boats are of the 46 ft. Watson cabin type. They will weigh 19¾ tons, and will have two 40 h.p. Diesel engines, giving a speed of 8¼ knots, and room for 95 people on board in rough weather. These will be stationed at Salcombe in Devonshire, Peterhead, Wick, and Tobermory, in Scotland, and Rosslaire Harbour in Ireland. The remaining boats are being built for the stations at Whitby, Barry Dock and Arklow. They are of the 41 ft. Watson type, weighing 15 tons. They will be equipped with two 35 h.p. engines, giving a speed of 8 knots, and will have accommodation for 55 people.

In addition to these eight boats the Institution has 10 others already under construction. One of these is to be installed at St. Helier, Jersey. It is to be called *"Howard D.,"* and will be of the light Liverpool type, with a length of 36 ft. 6 in., a breadth of 10 ft. 3 in., and a weight of seven tons. It will be driven by a 35 h.p. watertight engine, and have a range with refuelling of 100 miles.

Three new motor life-boats were completed at Cowes in February, and two of these have been stationed in Northumberland, at Boulmer and Cullercoats. They are named *"Clarissa Langdon"* and *"Richard Silver Oliver"* respectively, and are of the same type as the new St. Helier boat. The third boat, named *"John and Charles Kennedy,"* is of the 46 ft. Watson cabin type, and has been stationed at Fraserburgh.



The twin-screw cargo steamship "Clan Macaulay" with a gross tonnage of about 10,500, built by the Greenock Dockyard Co. Ltd., to the order of the Clan Line Steamers Ltd.

Lloyd's Marine Engineering Scholarship

The General Committee of Lloyd's Register of Shipping offer a Scholarship, value £100 a year for three years, to be awarded on the results of the Studentship Examination of the Institute of Marine Engineers to be held in June 1937. The Scholarship is intended to assist Marine Engineering students to take an advanced course of instruction in engineering subjects. The age limit is 18 to 23 years, and the closing date for entries is 1st May, 1937.

Full particulars, entrance forms and copies of previous papers may be obtained on application to the Secretary, The Institute of Marine Engineers, 85, The Minories, London, E.C.3. The entrance form for the Scholarship is distinct from the entrance form for the Studentship Examination, and a candidate for Studentship who wishes also to compete for the Scholarship must complete and return both forms by the dates specified.

Largest Oil-Engined Fire Float

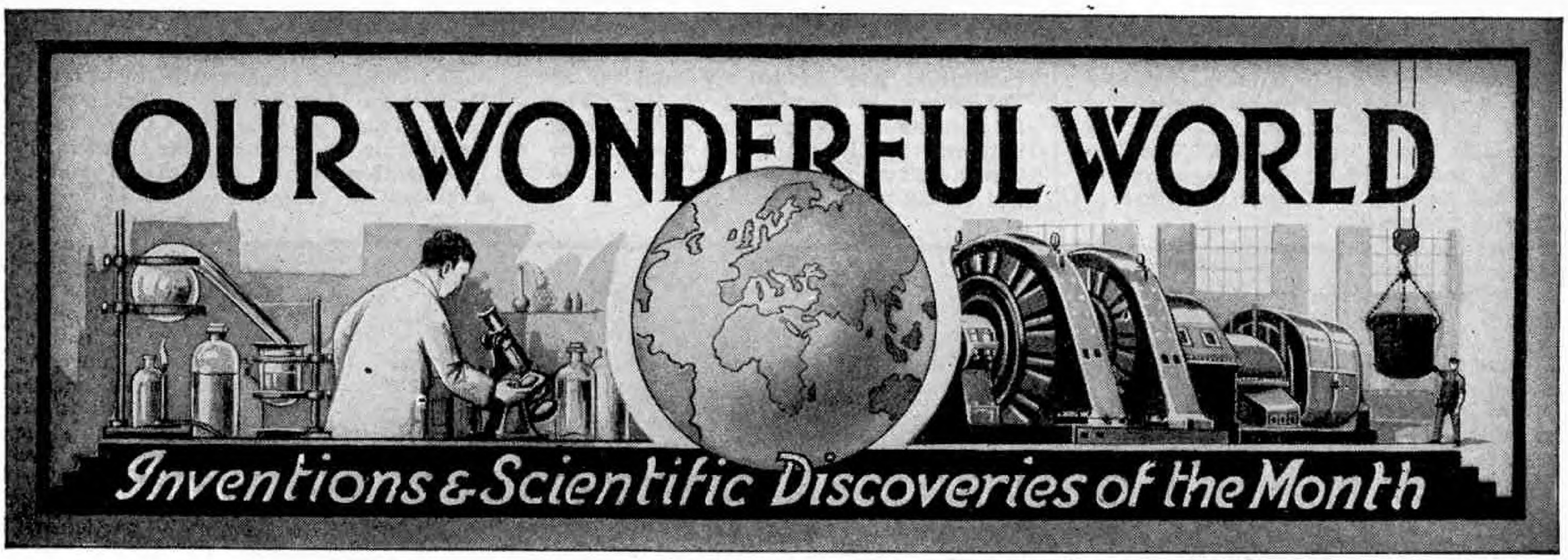
The world's largest oil-engined fire float is at present being built for the City of Chicago. It is 90 ft. 6 in. long, 22 ft. 4 in. broad, and has a moulded depth of 11 ft. The pump capacity at a pressure of 150 lb. per sq. in. is 7,500 gallons per minute, and at 300 lb. per sq. in. pressure it is 3,750 gallons per minute. The boat has five oil engines, two forward and three aft. The forward pair are for pump driving only. The wing engines of the other group are for both pumping and propulsion, and the centre unit for propulsion only. Each of the engines is rated at 250 h.p. at 1,000 r.p.m.

Life Raft with Underwater Platform

A recent life-saving invention for use at sea is a development of the lifebuoy. It takes the form of a raft built in the shape of a large bathtub. The rim is cork-filled, and from this hangs a rope net about 3 ft. deep, to the lower end of which is fastened a wooden board that serves as a floor on which people on the raft can stand. They are then submerged in about 3 ft. of water, but cannot be swept away even in rough and stormy seas. The raft can carry 25 people. Loops of rope attached to the rim are buoyed up by cork floats, so that those thrown into the water can cling to them for support.

* * * *

A motor vessel under construction at Belfast for the Union-Castle Line, to be named *"Capetown Castle,"* will be similar to the new *"Athlone Castle"* and *"Stirling Castle."*



How Bright is the Fire-Fly's Glow

It has been discovered that it would require 1,500 fire-flies to produce a glow of one candle power; we are told that in the Spanish American War of last century, Colonel Gorgas, who later rid the Panama Canal zone of malaria, was able to carry out an urgent operation by the light given out by fire-flies kept in a bottle.

The organ of the fire-fly that produces its light is situated in the last two segments of the abdomen, and consists of a fatty tissue containing a large number of air tubes. Under the microscope this organ is seen to glow softly, with occasional bright flashes here and there; and the display reaches a climax with a brilliant flash from the whole of the surface.

A chemical oxidation process produced by the release by the tubes of air rich in oxygen is the cause of the glow, which is seen when the fire-fly is stimulated or excited. The efficiency of this process is about 95 per cent., whereas the best light that Man has yet produced has an efficiency of only about one per cent., most of the energy put into his best lamps being given out again in the form of heat. The light of the fire-fly is cold light, but is not of much use as a general illuminant because it is concentrated in one colour.

The World's Rarest Animal

The rarest animal in the world is the giant panda, which has its home in the mountains that separate China from Tibet. Until late last year it had never been seen in captivity, and was known only from skins and skulls that had been discovered, and four specimens that had been shot.

The story of the giant panda began only 60 years ago, when a French missionary in China bought several skins of a kind that he had not previously seen. The skins resembled those of a piebald bear. The legs were black, this colour running over the shoulders and the back, and the rest of the body was white. The head also was white, but the ears were black and there were black rings round the eyes. From time to time other skins were obtained, but the creature itself was never seen by white men and remained a mystery until 1922, when a skull reached this country. The mystery eventually attracted Kermit and Theodore Roosevelt, the well-known American hunters. They set out for Western China in the hope of seeing this rare animal, and in 1928, after weeks of privation, they succeeded in tracking down an adult panda in a snowstorm and shot it. Their exploit led others to follow in their footsteps, with the result that three further specimens were shot.

Much time and money were devoted to the six expeditions that yielded these four pandas. Now a live giant panda has been secured in a seventh, led by Mrs. Harkness, an American lady whose husband had died in Shanghai while waiting for official permission from the Chinese authorities to go in search of one. The captive is only a baby, and is destined for the Bronx Zoo in New York. It would have been useless to capture an adult giant panda, for this lives entirely on bamboo, although it has powerful teeth and its ancestors must have been carnivorous, and it is scarcely likely that it would have taken to any diet that could have been provided for it in New York. The baby panda lives on milk, and it is hoped that as it grows up it will continue to thrive on foods that will be available there. It is an amusing and fascinating little creature, with a cry similar to that of a human infant.



Bear cubs treed by a sportive dog in one of Canada's National Parks. These parks are wild life sanctuaries. No guns can be carried unsealed in them, and deer, Rocky Mountain sheep and bears living there become quite tame.

Although the Chinese speak of the giant panda as if it were a bear, it really belongs to a family half-way between the bears and the racoons. The only other member of this strange family is the little panda, which is reddish in colour, with black legs, white ears and white markings on its face. This creature is about as large as a cat and has a long banded tail. It also lives in Central Asia, but is more common than its larger cousin, and has been exhibited at the London Zoo.

Farms on which Frogs are Grown

Some of the strangest farms in the world are those on which frogs are raised in the southern United States. Frogs have merits that are unsuspected by most people of Great Britain, for certain species are edible and in France, Italy and other countries their legs are regarded as great delicacies.

Night hunts formerly were carried on in marshy land in the United States to secure wild frogs, the hunters wading through the swamps with lights, spearing the frogs or shooting them with small rifles. It is said that at one time there were more than 3,000 men engaged in this work. Now there is a great industry that supplies frogs in increasing numbers, and the frogs of American farms are so highly valued that 40 recently were collected for export to Italy, where they were to be used for improving the breed of frogs reared in that country. These frogs were taken from Southern California.

Frog farms are formed in marshes, lagoons or ponds where there is plenty of life and vegetation. Many of them are surrounded by boards or wire fences to keep out snakes, rats, alligators and other enemies of the frog, and willows and other trees are planted along the banks to provide shade. The water is shallow, for all that is required is sufficient depth to protect the stock from excessive heat in summer and from frost in winter. At first the provision of suitable food was a great problem, for adult frogs will eat nothing that is not caught alive, or at least is not on the move. Beetles, moths and other insects are eagerly snapped up, and arc lights and incandescent lamps are now placed in position to attract these at night to the farms. In Japan, where similar farms have been established for many years, the problem was solved in a different manner. There the grubs of the silkworm are placed in trays containing a

little water, and these are kept in motion so that the grubs roll up and down and attract the frogs, which greedily devour them so long as they are seen to be moving.

The flesh of a frog's leg is said to be as valuable as beef or chicken. It has little fat in it and is very delicate and palatable. Besides providing food, frogs yield glue, that is particularly useful for mending crockery, and their skins are used for making leather for binding small books and lining purses.

Rivers of Mud

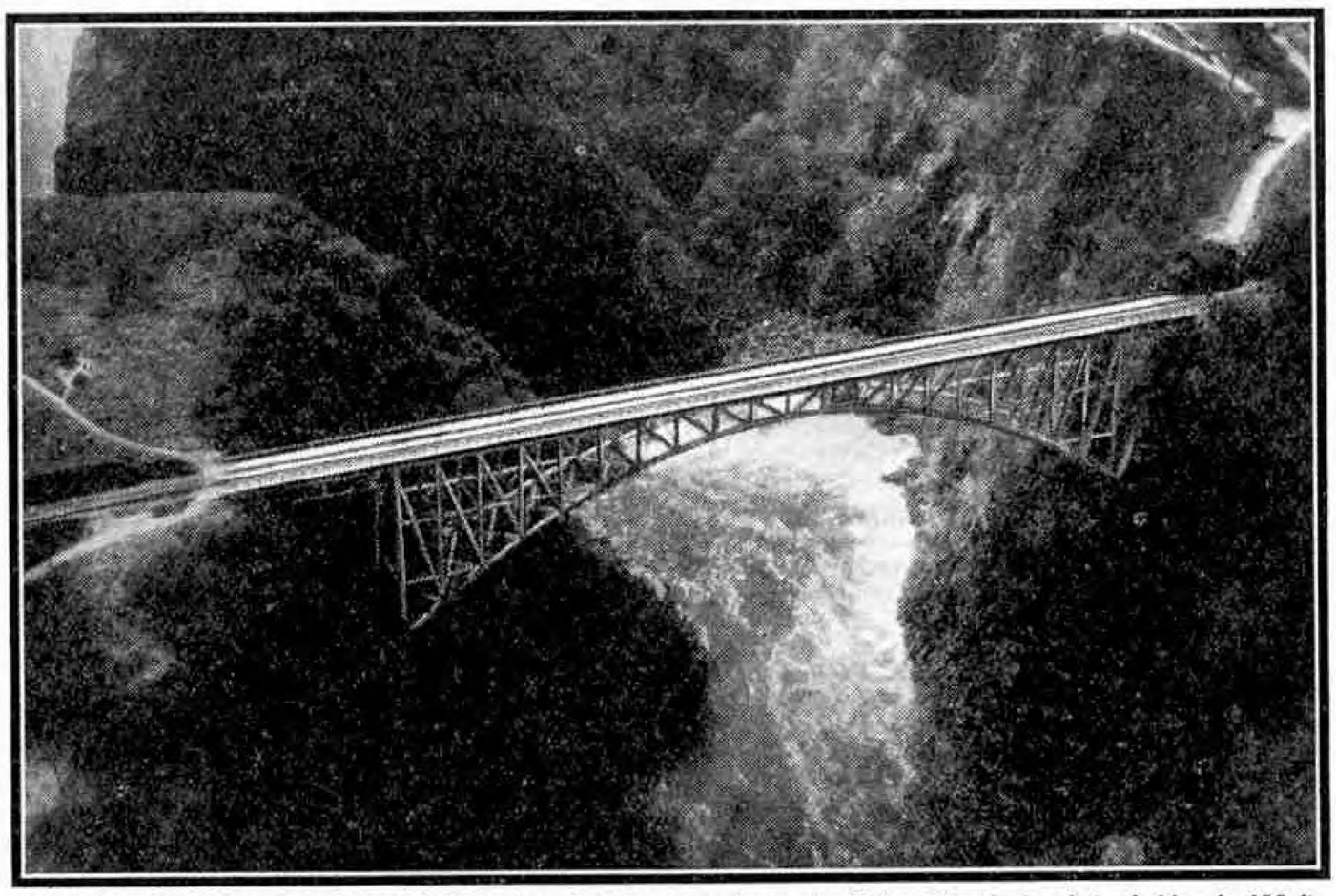
The recent disastrous floods in the United States, and the serious but comparatively small floods that have occurred in this country, are reminders of the great part that water plays in our lives. Rainfall seems to be essential to life, and countries where there is no rain are mostly uninhabited or sparsely populated deserts; but water, like fire, can be a bad master, although it is an excellent and even indispensable servant.

Excessive rainfall can produce terrifying effects. For instance, early in the present century torrential rain caused an enormous quantity of mud and lava to sweep down the slopes of Vesuvius, destroying everything in its path. One town was completely engulfed in mud that burst with great force against the walls of the houses, crushing in the doors and filling their interiors. The torrent terrified many people to such an extent that they were unable to summon up enough energy to save themselves. Many of them were overtaken by it, and cows and horses and other domestic animals also perished in great numbers. A similar mud stream occurred last century in the Phillipine Islands, when torrents of rain caused a deluge of mud and ashes to plunge down the side of a volcano, and to break down bridges, destroy houses and block roads.

There also have been many instances in which the rain has not created mud capable of flowing like a river, but has loosened the soil so that it has slipped downward along the underlying rock. Landslides of this kind of course are most common in countries where there is a wet season with torrential rainfalls. There washouts of railway bridges and similar events are by no means uncommon, but landslides have also been known in Great Britain where the rainfall is not heavy, and is spread out over the whole year. The greatest British landslide occurred in 1839 between Lyme Regis and Axmouth, where a chasm three-quarters of a mile in length was left.

Mountainous countries also are particularly liable to landslides after exceptionally heavy rain, and some have broken loose in Switzerland. In one of these three small villages were buried almost in an instant to a depth of 200 ft., and the motion of the land was so swift and violent that sparks were formed by the friction of the rocks rubbing against each other. It is believed that the mass of moving earth was more than 50 million cu. yd. in volume. Its length was over two miles and its width nearly a quarter of a mile. Many people have lost their lives in similar Swiss landslides, for the moving earth plunges downward with the speed of an avalanche and it is impossible to take any steps to ensure the safety of those threatened with destruction by it.

Events such as these are spectacular forms of water action, but rain is always at work, eating away earth and rock, and throughout the ages it has been one of the greatest agents in shaping the surface of the Earth. Our great mountain chains are steadily running down to the sea, worn away by rain and frost and washed into the rivers. The rain takes a long time to do its work, but it acts ceaselessly and remorselessly, and is certain in the end to win in its fight against rock and stone. It has been estimated that every year 618 million tons of matter from the Andes are swept away down the channel of the Amazon River alone, and an even greater quantity must be carried by the waters of the other rivers that have their sources in these mountains. So great is this loss that the Andes will be worn away in nine million years if it continues at the same rate.

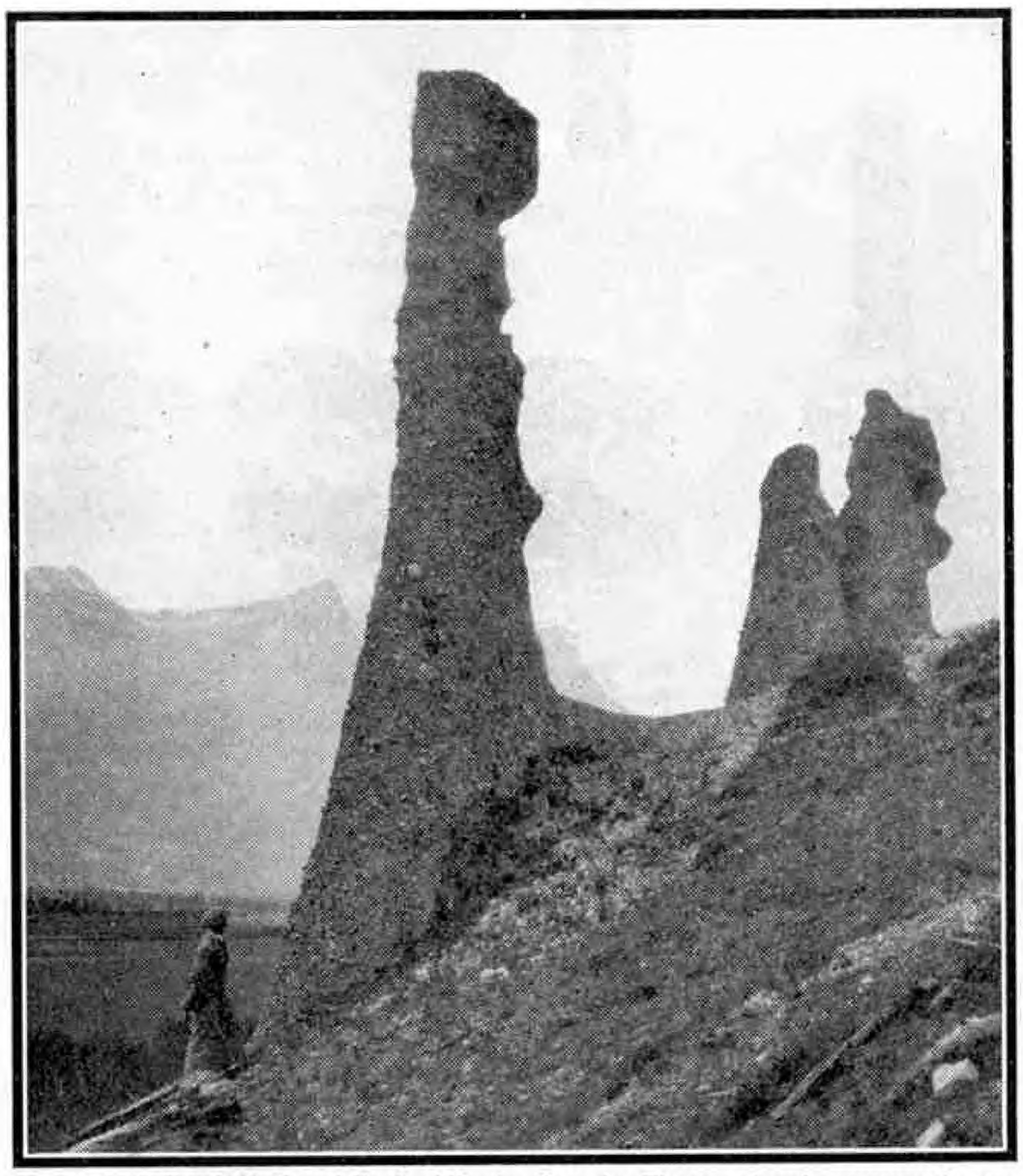


The Victoria Falls rail and road bridge drenched in spray from the Falls. The deck of the bridge is 400 ft. above high water level. Photograph by courtesy of South African Railways.

Pillars Carved by Rain

Sometimes the effect of rain is merely fantastic. The lower illustration on this page shows an excellent example of a pillar that has been carved by rain. There are many earth pillars of this kind in the Tyrol, the Himalayas, Scotland, America and elsewhere. That illustrated is in Banff National Park, in Canada, and is one of the pillars known as Hoodoos and regarded with superstition by the Stoney Indians of the district. Some of these pillars suggest crude attempts of some savage artist to represent his primitive gods.

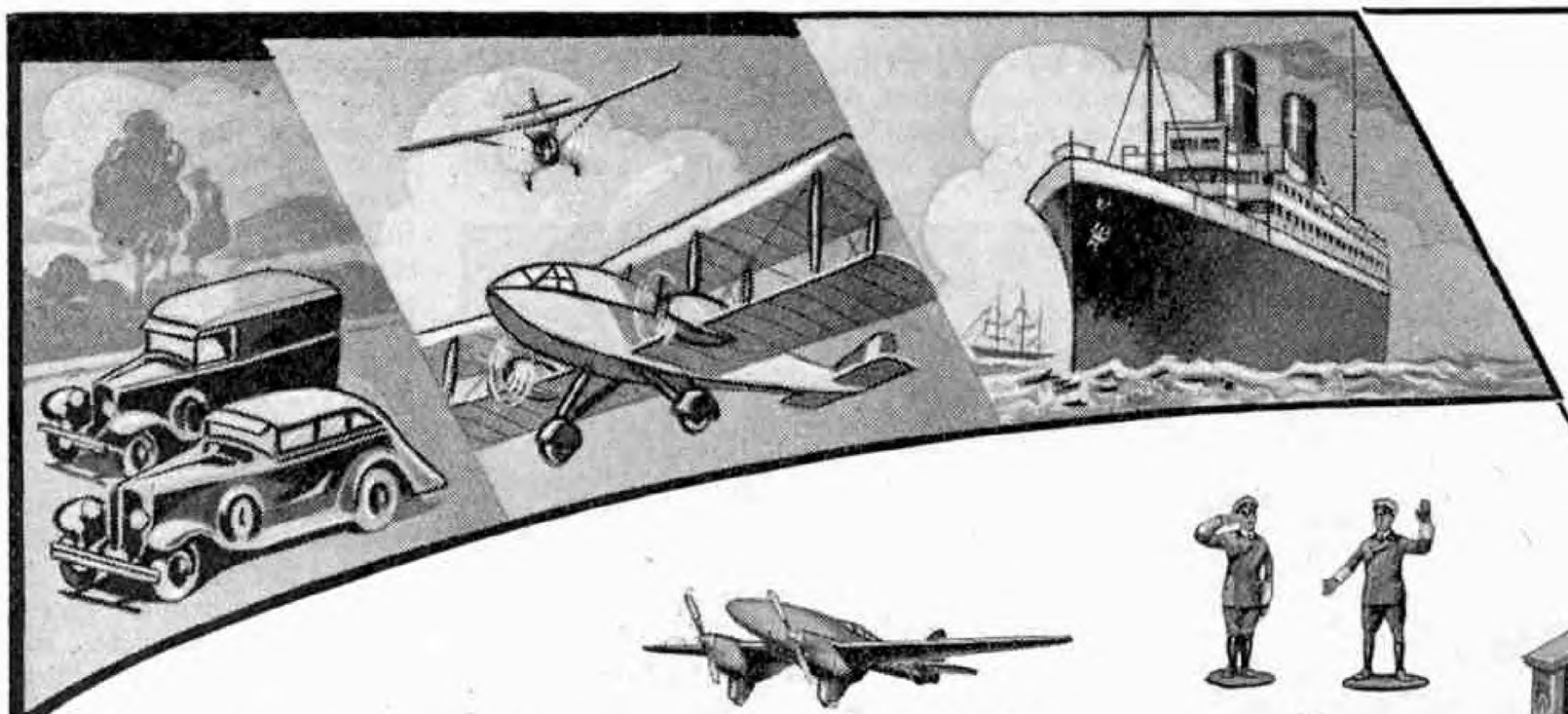
The usual form of earth pillar is capped by a stone or boulder. This has played a great part in its formation, for it has protected the earth below it, so that the clay or silt round about it has been washed out by rain and by rivulets flowing in the depressions thus formed between them. The disappearance of a stone usually results in the collapse of the pillar before the attack of the rain, the rate at which the pillar is washed away depending of course on the material of which it is composed.



Hoodoos in Banff National Park, Alberta, Canada. These natural monuments are regarded with superstitious awe by the Stoney Indians of the district.

Burning Coal Mine Creates Miniature Volcanoes

Water plays an important part in volcanic action, and it is a commonplace among geologists that without it there can be no volcanism. This was recently illustrated in a remarkable manner in the United States, where immense quantities of water stored up in the earth are finding their way into mines that have been abandoned because the coal had taken fire. The water is converted into steam with explosive violence as it reaches the white hot mass, and at various places in the surrounding district the steam has broken through the earth to form what can only be described as miniature volcanoes, which have caused great alarm to the people in the neighbourhood. Efforts are now being made to prevent these eruptions by cutting off the supply of air that keeps the coal burning, and thus to extinguish the central fire that causes these unique outbreaks.



DINKY

250 Vari

A FASCINATING COL

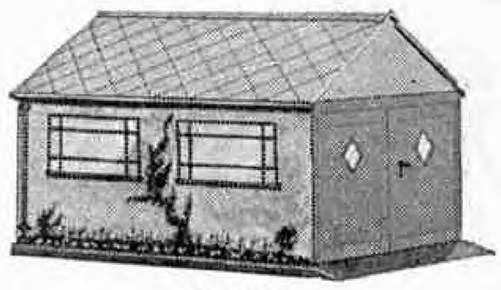
One of the most fascinating of all hobbies charming miniatures are unique in their rich Recently many additions have been mad range now available, including more than 25 interest every boy and girl.

Many of the Dinky Toys are spec touches to Hornby Railway Layouts; wh Signals, Road Signs, Motor Vehicles a use in making up fascinating road tions of British and foreign li vessel the "*Queen Mary*," Navy, all of which can be model dockyards.

Unlimited fun can be had miniatures either on the table with some of them such exciting race games can be Every boy and girl delightful collecting ho the toys can be purcha or they may be obta plete sets.

Ask your Me Hornby dealer fo list giving det the complete ra Dinky Toys.

PRODUC of MECCA LIMITED LIVERPOO

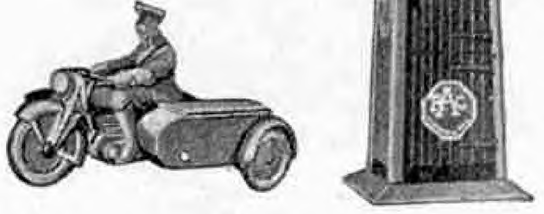


GARAGE
Dinky Toys No. 45
Fitted with opening double doors. Will accommodate any two Dinky Toys Motor Cars. **Price 1/3 each.**

D.H. "COMET" AEROPLANE
Dinky Toys No. 60g
Scale model of plane used by C. W. A. Scott and T. C. Black in their Australian flight. Price 6d. each



STREAMLINE SALOON
Dinky Toys No. 22h
Assorted colours. Fitted with rubber tyres. Price 4d. each



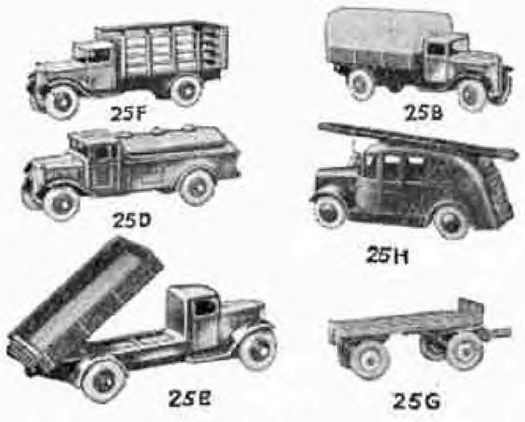
R.A.C HUT, MOTOR CYCLE PATROL AND GUIDES
Dinky Toys No. 43
This set is representative of the familiar personnel and road hut of the R.A.C. Each item is finished in correct colours.

No. 43a	R.A.C. Hut	each	6d.
No. 43b	R.A.C. Motor Cycle Patrol ...	,,	9d.
No. 43c	R.A.C. Guide directing traffic ...	,,	3d.
No. 43d	R.A.C. Guide at the salute ...	,,	3d.

Price of complete set 1/9



ROYAL AIR MAIL SERVICE CAR
Dinky Toys No. 34
In correct colours. Fitted with rubber tyres. Price 6d. each



COMMERCIAL MOTOR VEHICLES
Dinky Toys No. 25

No. 25b	Covered Wagon... ...	each	9d.
No. 25d	Petrol Tank Wagon ...	,,	9d.
No. 25e	Tipping Wagon	,,	9d.
No. 25f	Market Gardener's Van...	,,	9d.
No. 25g	Trailer	,,	7d.
No. 25h	Streamline Fire Engine ...	,,	9d.

Price of complete set 4/3

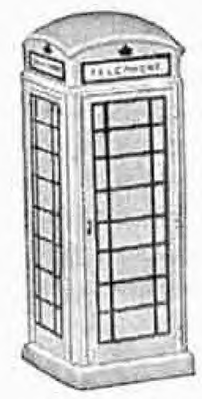


PILLAR LETTER BOX AIR MAIL
Dinky Toys No. 12b
Price 3d. each

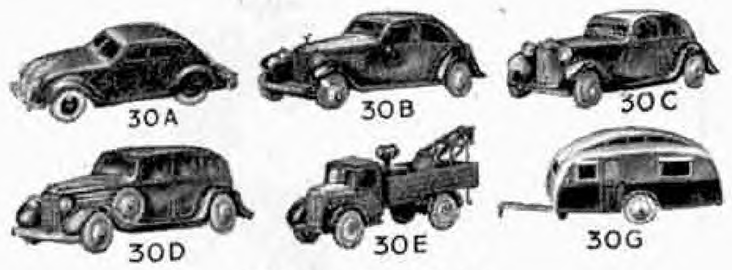
PILLAR LETTER BOX G.P.O.
Dinky Toys No. 12a
Price 3d. each



PAVEMENT SET
Dinky Toys No. 46
Containing four 3-inch strips of pavement, six 6-inch strips of pavement, four 12-inch strips of pavement, and four quarter discs for corners.
Price of complete set 6d.



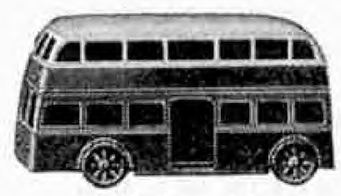
TELEPHONE CALL BOX
Dinky Toys No. 12c
Price 4d. each



MOTOR VEHICLES
Dinky Toys No. 30

No. 30a	Chrysler Airflow Saloon	each	6d.
No. 30b	Rolls-Royce Car	,,	9d.
No. 30c	Daimler Car	,,	9d.
No. 30d	Vauxhall Car	,,	9d.
No. 30e	Breakdown Car...	,,	9d.
No. 30g	Caravan Trailer...	,,	6d.

Price of complete set 3/11



MOTOR BUS
Dinky Toys No. 29a
Assorted colours.
Price 4d. each



MOTOR TRUCK.
Dinky Toys No. 22c
Assorted colours. Fitted with detachable rubber tyres.
Price 6d. each



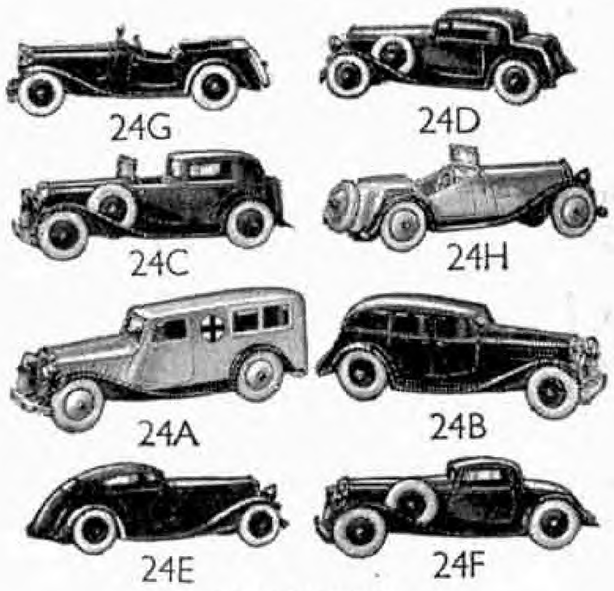
Dinky Toys No. 60.
No. 60a Imperial Airways Liner
No. 60b D.H. "Leopard Moth"
No. 60c Percival "Gull" ...
No. 60d Low Wing Monoplane
No. 60e General "Monospar"
No. 60f Cierva "Autogiro"
Price of complet





R.A.F. AEROP
Dinky Toys N

No. 60h Singapore Flying Boat ... ...
No. 60p Gloster "Gladiator" Biplane (2) ... ...
No. 60n Fairey "Battle" Bomber (2) ... ...
Price of complete



MOTOR CARS
Dinky Toys No. 24
Fitted with detachable rubber tyres and silver-plated radiators

No. 24a	Ambulance	each	6d.
No. 24b	Limousine	,,	6d.
No. 24c	Town Sedan	,,	6d.
No. 24d	Vogue Saloon...	,,	6d.
No. 24e	Super Streamline Saloon ...	,,	6d.
No. 24f	Sportsman's Coupe	,,	6d.
No. 24g	Sports Tourer (4 seater) ...	,,	6d.
No. 24h	Sports Tourer (2 seater) ...	,,	6d.

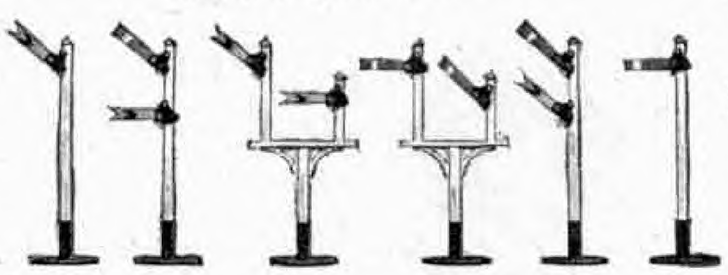
Price of complete set 3/11



ROBOT TRAFFIC SIGNAL
Dinky Toys No. 47a
(Four-face)
Price 3d. each

ROBOT TRAFFIC SIGNAL
Dinky Toys No. 47b
(Three-face)
Price 3d. each

ROBOT TRAFFIC SIGNAL
Dinky Toys No. 47c
(Two-face)
Right-angle or Back-to-back.
Price 3d. each



RAILWAY SIGNALS
Dinky Toys No. 15

No. 15a Single Arm Signal. One "Home" and one "Distant" each 2d.

No 15b Double Arm Signal. One "Home" and one "Distant" each 3d.

No. 15c Junction Signal. One "Home" and one "Distant" each 4d.

Price of complete set 1/6

MECCANO LTD.,

Y TOYS

arieties

COLLECTING HOBBY

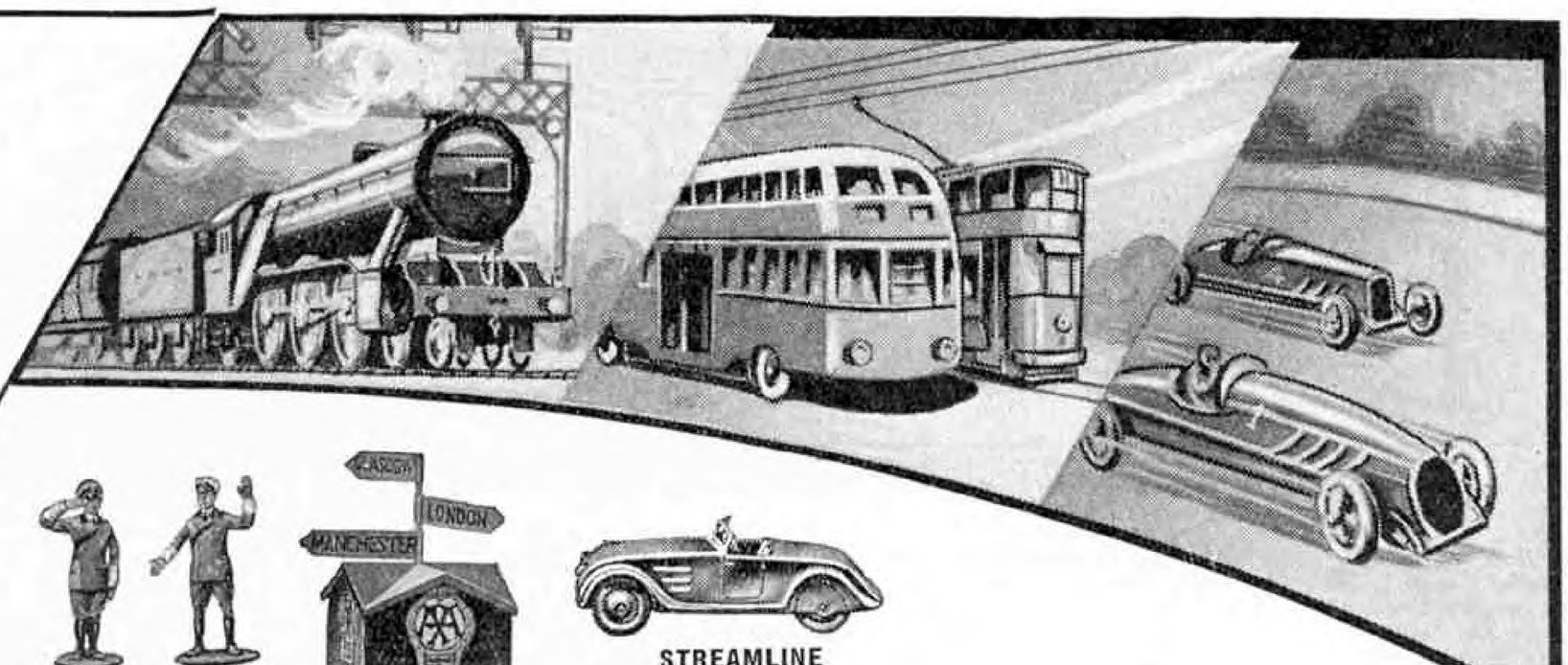
obies is that of Dinky Toys collecting. These rich colouring and perfection of finish. made to the series, and in the splendid n 250 models, there are items that will

specially useful for adding finishing while others, such as the Traffic and Petrol Pumps, are ideal for enes. There are also rep oduc- s, including Britain's wonder famous ships of the British ed with realistic effect in

had in playing with these able or on the floor, and ich as the Sports Cars n be devised. girl should start this hobby to-day. All urchased separately, obtained in com-

Meccano and r for a price details of te range of s.

DUCT of CCANO AITED RPOOL







A.A. HUT, MOTOR CYCLE PATROL AND GUIDES
Dinky Toys No. 44
Collectors of Dinky Toys will find this new addition to the range of particular interest.
Each item is finished in correct colours.

No. 44a	A.A. Hut	each 8d.
No. 44b	A.A. Motor Cycle Patrol ...	„ 9d.
No. 44c	A.A. Guide directing traffic...	„ 3d.
No. 44d	A.A. Guide at the salute ...	„ 3d.

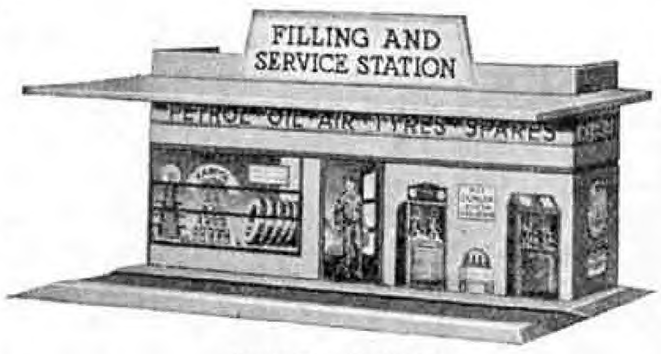
Price of complete set 1/11

STREAMLINE TOURER
Dinky Toys No. 22g
Assorted colours. Fitted with rubber tyres. Price 4d. each

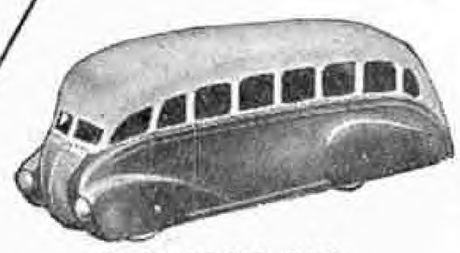


HALL'S DISTEMPER ADVERTISEMENT
Dinky Toys No. 13
This miniature of a well-known lineside advertisement is intended to be placed in the fields adjoining the railway track. Price 9d. each

Every Dinky Toy contained in the complete sets can be purchased separately if desired.



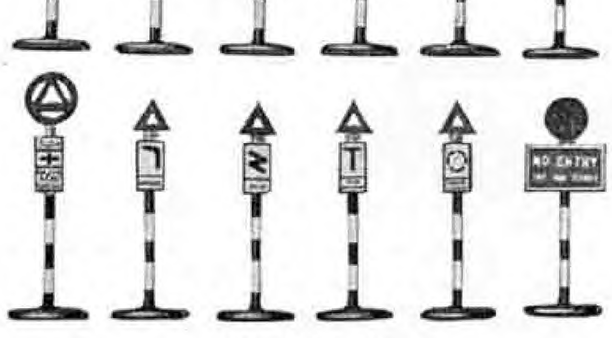
PETROL STATION
Dinky Toys No. 48
Accurate reproduction of a filling station. Tastefully printed in appropriate colours. Price 1/3 each



STREAMLINE BUS
Dinky Toys No. 29b
Price 6d. each



RAILWAY MECHANICAL HORSE AND TRAILER VAN
Dinky Toys No. 33R
Price complete, L.M.S.R., L.N.E.R., G.W.R. or S.R., 1/6



ROAD SIGNS
Dinky Toys No. 47

No. 47e	"30 Mile Limit" Sign ...	2 for 3d.
No. 47f	"De-restriction" Sign ...	„ 3d.
No. 47g	"School" Sign	„ 3d.
No. 47h	"Steep Hill" Sign	„ 3d.
No. 47k	"Bend" Sign...	„ 3d.
No. 47m	Left-hand "Corner" Sign ...	„ 3d.
No. 47n	Right-hand "Corner" Sign ...	„ 3d.
No. 47p	"Road Junction" Sign ...	„ 3d.
No. 47q	"No Entry" Sign	„ 3d.
No. 47r	"Major Road Ahead" Sign...	„ 3d.
No. 47s	"Crossing, No Gates" Sign...	„ 3d.
No. 47t	"Round-About" Sign ...	„ 3d.

Price of complete set of twelve 1/6



HOTCHKISS RACING CAR
Dinky Toys No. 23b
Assorted colours. Fitted with rubber tyres. Price 4d. each



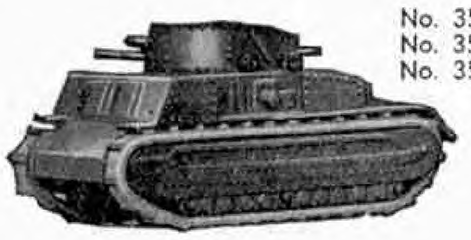
SMALL CARS
Dinky Toys No. 35

No. 35a	Saloon Car	each 3d.
No. 35b	Racer	„ 3d.
No. 35c	"M.G." Sports Car	„ 3d.

Price of complete set 9d.



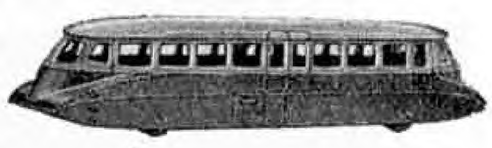
BEACON
Dinky Toys No. 47d
(Realistic models of the Belisha Safety Beacons)
Price 1d. each



TANK
Dinky Toys No. 22f
Price 9d. each



TRAM CAR
Dinky Toys No. 27
Assorted colours.
Price 3d. each



G.W.R. RAIL CAR
Dinky Toys No. 26
Assorted colours. Price 4d. each







60C



60B

AEROPLANES

...er	... ...	each 9d.
Moth"	... ...	„ 6d.
...	... ...	„ 6d.
oplane	... ...	„ 6d.
spar"	... ...	„ 6d.
o"	... ...	„ 6d.

mplete set 3/-



TRACTOR
Dinky Toys No. 22e
Price 9d. each



280C 280D 280A
280F 280E 280B

DELIVERY VANS
Dinky Toys No. 280

No. 280a	Viyella Van	each 6d.
No. 280b	Lyon's Van	„ 6d.
No. 280c	Shredded Wheat Van	„ 6d.
No. 280d	Bisto Van	„ 6d.
No. 280e	Ekco Van	„ 6d.
No. 280f	Mackintosh's Van	„ 6d.

Price of complete set 3/-



MECHANICAL HORSE AND FOUR ASSORTED TRAILERS
Dinky Toys No. 33
Fitted with rubber tyres.

No. 33a	Mechanical Horse	each 6d.
No. 33b	Flat Truck	„ 6d.
No. 33c	Open Wagon	„ 6d.
No. 33e	Dust Wagon	„ 8d.
No. 33f	Petrol Tank	„ 8d.

Price of complete set 2/9



0H
EROPLANES
oys No. 61

...	... ...	each 1/-
...	... ...	„ 6d.
...	... ...	„ 4½d.

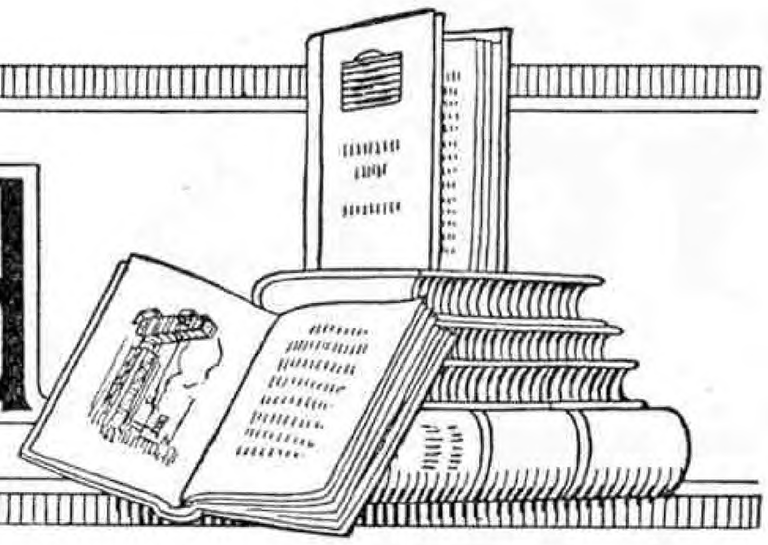
mplete set 2/9



60N

D., LIVERPOOL 13

Books to Read



Here we review books of interest and of use to readers of the "M.M." We can supply copies of these books to readers who cannot obtain them through the usual channels. Order from Book Dept., Meccano Limited, Binns Road, Liverpool 13, adding 1/- for postage to the price. Postage on different books varies, but any balance remaining will be refunded.

"A History of the Merchant Navy"

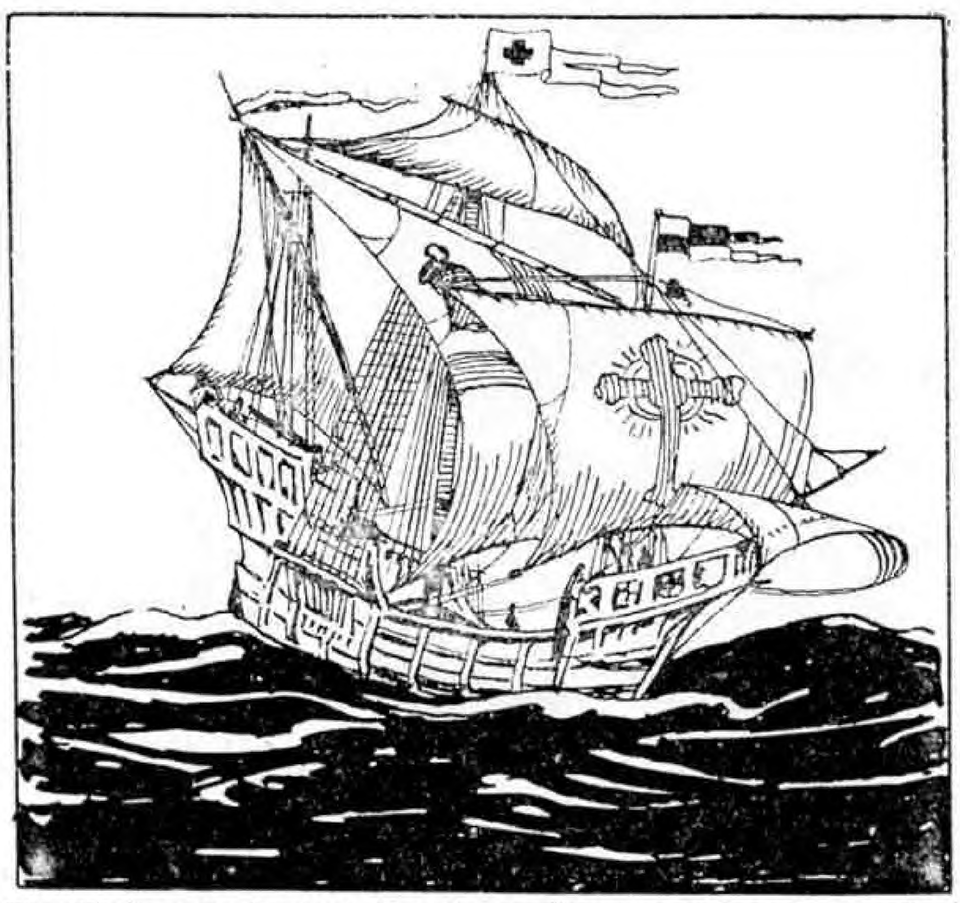
By H. Moyse-Bartlett, B.A. (Harrap. 7/6 net)

All British boys are keenly interested in the sea and its story, and will welcome this account of the wonderful part that British sailors have played in discovery and exploration. The book is lively and attractive, for the author is particularly interested in the men who took part in these exploits. He emphasises the fact that their lives are history, and points out in his preface that similar enterprise and courage is shown by seamen to-day, as in the wonderful voyage of 1,500 miles in open lifeboats made by the crew of the cargo steamer *"Trevessa"* after their ship had foundered in the Indian Ocean in 1923.

After a general survey of the beginnings of navigation in the Mediterranean Sea in ancient times, and of the achievements of early Chinese and Viking explorers, the author turns to the growth of the sea-borne trade of Great Britain, giving many interesting details of the lives of seamen in the days of the Crusades, and in succeeding centuries. Then came the brilliant age of discovery, beginning with the voyages of the Portuguese along the African coast and rising to a climax with the great enterprises of Columbus and those who followed him across the Atlantic Ocean to the New World. At first Britain's share in this work was limited, but under the lead of the Cabots English seamen soon made up for their slowness in starting, and now rank high as pioneer navigators and explorers. The stories of the voyages of Hawkins, Drake and other famous Elizabethans who challenged Spanish supremacy are splendidly told. Later came Hudson, Baffin and others whose explorations revealed new lands and seas in the Arctic regions, while the buccaneers and pirates who harried the American possessions of Spain were true seafarers, if many of their feats were discreditable.

Interest at this stage was not confined to the West, for British seamen made their way east to India, the Spice Islands and China. Later discoveries in Australasian waters and in the South Seas are almost entirely due to them, and we read of the exploits of Dampier, the pirate who became a famous explorer, and of Captain Cook, who is said to have discovered a greater length of previously unknown coast line than any sailor who ever lived. Cook's work belongs to the age of expansion rather than to that of discovery, but he ranks high as a practical and courageous seaman.

While taking his readers with him in his story of these stirring times, the author shows them how larger and better ships came to be built and explains the means whereby mariners found their way across the seas with ever-increasing certainty. He also tells us how regular ocean routes were opened up, and his story increases in interest when he comes to the development of the East Indiamen, whose crews were as smart as those of a man o' war, the Black Ball Line of sailing packets, and the tea clippers of last century, the most famous of all sailing ships. Finally he deals with the modern Merchant Navy, and shows how during the last century the sailing ship has given place to the steamship, without alteration in the character of the service.



The "Matthew" of Bristol, in which in 1497 John Cabot made his first voyage of exploration across the Atlantic Ocean. From "A History of the Merchant Navy," reviewed on this page.

It is impossible in this brief review to indicate all the many interesting features of the book. It is full of details of ships and sailors, and admirably fulfils the author's aim to "relate in concise yet comprehensive form the stories of discovery and exploration by British merchant sailors." An excellent series of maps and line drawings serve to illustrate the story.

"Wood Decoration with V-Tool and Gouge"

By A. W. Lewis. (Technical Press. 2/6 net)

Many wood carvers must have felt the need for a handy book giving advice and instruction on the use of their tools, and on the making of the various cuts that go to complete their designs. Mr. Lewis supplies this want. His readers are supposed to have only five tools with which to work, and the best way of making use of each is indicated shortly but adequately. The elements of design and surface decoration are then dealt with, and finally comes an excellent series of designs. There are 39 excellent illustrations, mostly in half-tone.

"Modern Clocks"

By T. R. Robinson. (N.A.G. Press. 4/- net)

There have been many changes in the clock world in recent years, which have seen the introduction of mass produced clocks, the movements of which differ considerably from those of the old-fashioned type. In addition there has been a great increase in the popularity of quarter chiming clocks, formerly comparatively rare because they were made by hand, but now obtainable at a reasonable price. An even more important development has been the introduction of the synchronous electric clock.

Mr. Robinson's aim in this book has been to provide practical information on all varieties of modern clocks for the benefit of repairers and others who are interested in them. The author is well qualified for this task, for he is himself a practical clock maker and repairer, and as Technical Editor of *"The Watch and Clockmaker"* and a contributor to the *"M.M.,"* he has gained wide experience in explaining technical matters.

Every phase of design in domestic clocks has been closely studied for this work. There is a particularly interesting chapter on synchronous electric clocks, the mechanisms of several makes being well explained, and a final section describes clock movements for time switches and for other special purposes. Throughout technicalities are dealt with exactly and at sufficient length, but the descriptions given are simple and good use is made of illustrations, of which there are 108, including both plates and drawings in the text. The book is one that will appeal strongly to the mechanically-minded boy who is attracted by clocks and enjoys working with them.

"The Book of Nature's Marvels"

By Frances Jenkins Olcott. (Harrap. 7/6 net)

In her foreword Miss Olcott remarks that there is no end to the joy that the country can furnish, and she has collected the 130 stories and articles included in her book in order to bring this home to boys and girls. The author herself has written 40 of these stories, all of which are contributed by authors who have direct personal experience of the things they describe. For instance, Commander Byrd and Miss Amelia Earhart tell of their flights above the clouds, J. E. Williamson and Dr. Beebe take us with them in wonderful adventures in the depths of the sea, Sir Arthur Edington and Sir James Jeans write of the stars in space, Henri Fabre explores the insect world, and Dr. Nansen describes the Aurora Borealis.

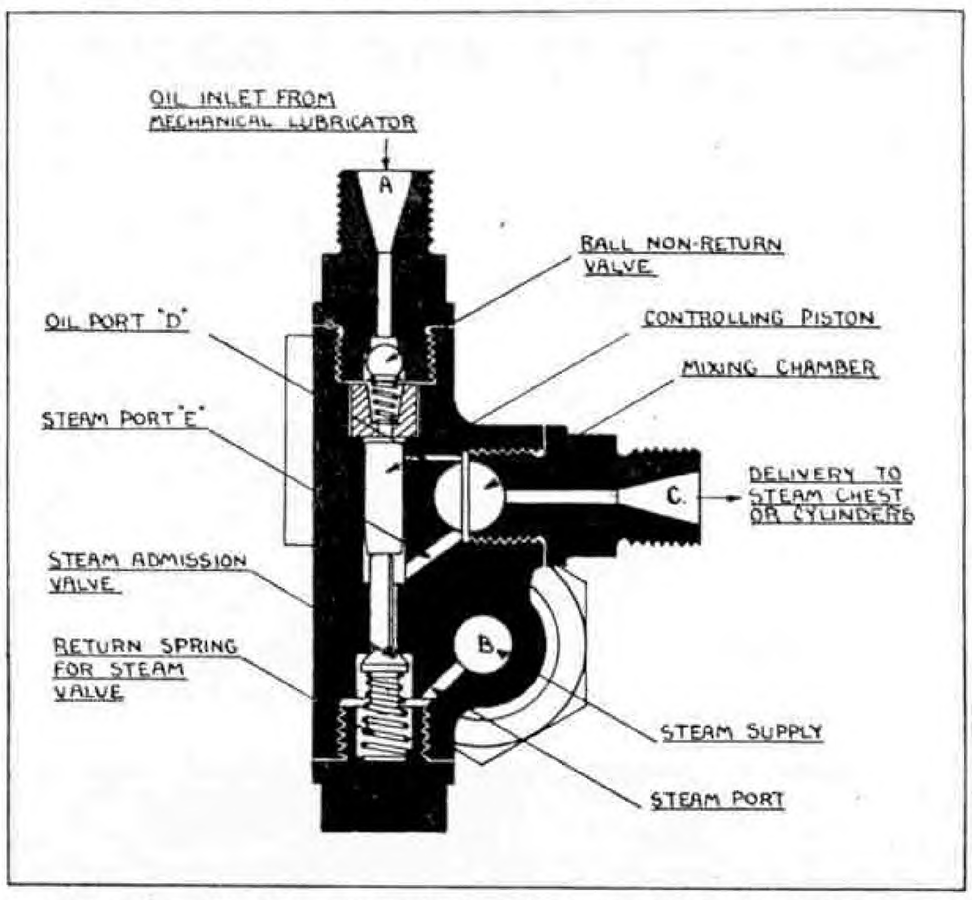
The stories form a complete treasure chest of information about the world's wonders and make fascinating reading for any boy or girl, who at all times will be able to dip into the book and find something to marvel at. The illustrations add greatly to the attractions of the book. There are 30 full page plates and a frontispiece.

L.M.S.R. Enginemen's M.I.C. Papers 1936

(L.M.S. MAGAZINE 4d. post free)

This booklet contains reprints of the articles published regularly during the past year in the *"L.M.S. Magazine"* for the benefit of enginemen. These contain information on various aspects of locomotive work, and give details of the construction, operation and maintenance of different parts of the engine. These reprints are useful to railwaymen, and also are specially attractive to readers of the *"M.M."* who are interested in locomotives. The popularity of the booklet may be gauged by the fact that the previous issues, amounting to 23,000 copies, are now out of print.

The latest edition includes numerous details, illustrated by diagrams, in connection with locomotives of the L.M.S.R. Some items are peculiar to the latest standard engines, but others are common to previous designs as well. Lubricator details, sanding gear, cylinder equipment, steam brake cylinders and brake rigging are among the mechanisms described. A particularly attractive feature is a double-page sectional view of the L.M.S.R. "Turbomotive," No. 6202, which shows the chief internal arrangements of this remarkable locomotive in such a manner that its operation can be readily followed. Railway enthusiasts who follow the movements of engines will welcome the list of L.M.S.R. Motive Power Depots and their identification numbers and letters given in the booklet.



The atomiser of a new standard L.M.S.R. locomotive. This device breaks up oil for lubrication into very tiny globules. From "L.M.S.R. Enginemen's M.I.C. Papers 1936," reviewed on this page.

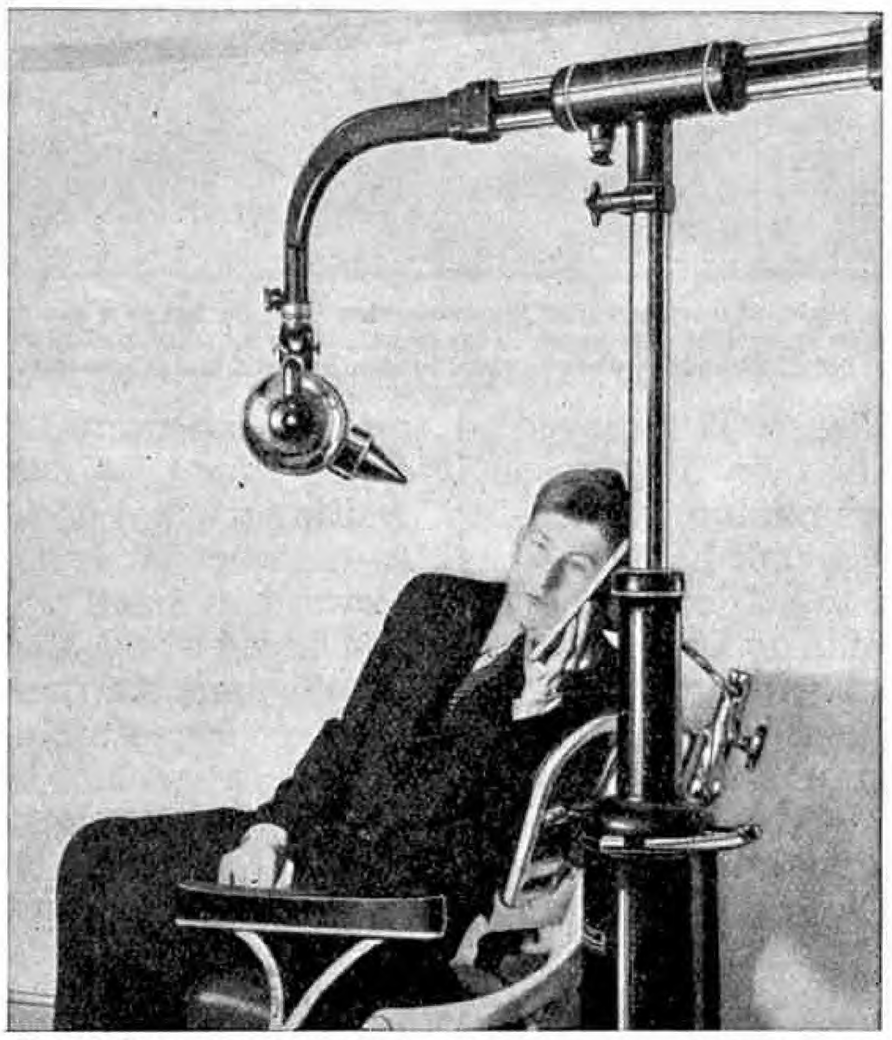
"Electrical Inventions"

By A. M. Low. (Nelson. 2/6 net)

This is one of a series of "Discovery Books," designed to give to young readers some idea of the world in which they live. Professor Low's contribution is of special interest, for new uses are being found almost every month for electricity, the most romantic discovery in the world, as he calls it, and the author describes inventions in which it is applied in non-technical language that is easy to read, but reveals clearly the purpose behind them and the manner in which they work.

Electricity is used chiefly to give us light, heat and power, and the author gives the latest developments in its applications to these three purposes. Thus the story of lighting by electricity includes mention of the discharge lamps now coming into use for street lighting purposes. Similarly the chapter on heating deals with furnaces producing temperatures up to 4,000 deg. C., and with electric welding, one of the most powerful weapons of the modern engineer; while the immense advantages that would follow the complete electrification of factories are explained in the section on power. A fascinating account of lighting and its effect follows, and attention is then turned to the manner in which electricity is widely distributed so as to make it available to people in country and town alike at as little expense as possible.

Such subjects as radio, television and the uses of photo-electric cells are next taken up. All of these are practical applications of electrical principles, and the author records faithfully the methods dealt with by the inventors and scientists who have developed them. Finally comes an account of what is described as "odd work for electricity."



Dental X-ray apparatus in use. The set is safe, as no cables are exposed. From "Electrical Inventions," reviewed on this page.

"His Majesty and Company"

By Joy Hays. (Phillip Allen. 2/6 net)

Here is a book that will thoroughly delight younger *"M.M."* readers. His Majesty is a very undignified King, but his ridiculous adventures are great fun. He thoroughly enjoys himself, whether he is playing in the snow in spite of the chilblain on his nose, or is captured by bandits whose severe treatment in their cave makes him agile and strong instead of merely fat and lazy. He has great fun in a circus and there and elsewhere emerges triumphantly from the scrapes he gets into. He is constantly in trouble, for his Queen tyrannises over him, but he will be a hero with all who read about him, for he loves doing just the simple things that every boy and girl delights in, and they will revel in his marvellous escapes.

The youthful author has illustrated her own book, and her drawing is as humorous and successful as her manner of telling a story.

"Green Laurels"

By D. C. Peattie. (Harrap. 12/6 net)

To the many readers of the *"M.M."* who are interested in the science of living things, whether plants or animals, and especially to the older ones among them, Mr. Peattie's account of the lives and achievements of great naturalists will appeal very strongly. It is brightly written and very readable, for Mr. Peattie is intensely interested in Nature and reveals his enthusiasm in his writings.

The naturalists whose stories Mr. Peattie has chosen to tell have been selected for their practical contributions to what the author picturesquely calls the green world that opened with Linnæus, the great Swedish botanist. Among them are Linnæus himself and several of his predecessors, Lamarck, the pioneer of evolution, Cuvier, his great opponent and rival, John Bartram, the Quaker ploughman-naturalist, Alexander Wilson, the Scottish weaver and pedlar who studied birds in the American wilderness, and Goethe, the German poet who was also a naturalist. Darwin and Wallace could not be omitted from such a book as this, and the story of their travels abroad, and of the conclusions to which their studies led them, is followed by an account of the great controversy that followed Darwin's publication of the theory of evolution, described by Mr. Peattie as "the most exciting and fruitful idea that has ever dawned upon the mind of man." Lastly comes a chapter on Fabre, the patient student of insect life. The 32 plates in photogravure include excellent portraits of many of the men whose lives are told, together with pictures of interesting scenes in their careers.

"Handcraft in Wood and Metal"

By J. Hooper, O.B.E., and A. J. Shirley. (B. T. Batsford Ltd. 10/6 net)

The value of this excellent book is sufficiently shown by the fact that the present is the fifth edition that has been called for. The original work was prepared as long ago as 1913, and in it the authors aimed at showing that handcraft was much more than carpentry, as was too often assumed, and had real educational value.

The present edition is enlarged and revised, and examination of its pages reveals the reason for the great success of previous editions. A complete and carefully graded course of lessons in both wood and metal is provided, and the treatment throughout is thorough and original, and calculated to develop true craftsmanship and appreciation of artistic work. An interesting feature is a supplementary section giving designs for cabinets, clock cases and wireless fittings in wood. The book contains over 300 working drawings and illustrations of handcraft work.

"Arithmetic For All"

By H. J. Larcombe, Ph.D., M.A., B.Sc. (Gresham. 7/- net)

The author believes that even arithmetic need not be dull and dry, and has tried to change it from a terrifying subject in which sums are always coming out wrong into a game that he hopes they will enjoy. Those who use his book should learn to think about what they are doing, instead of memorising rules, and should develop ability to deal in an intelligent manner with numbers and problems involving them.

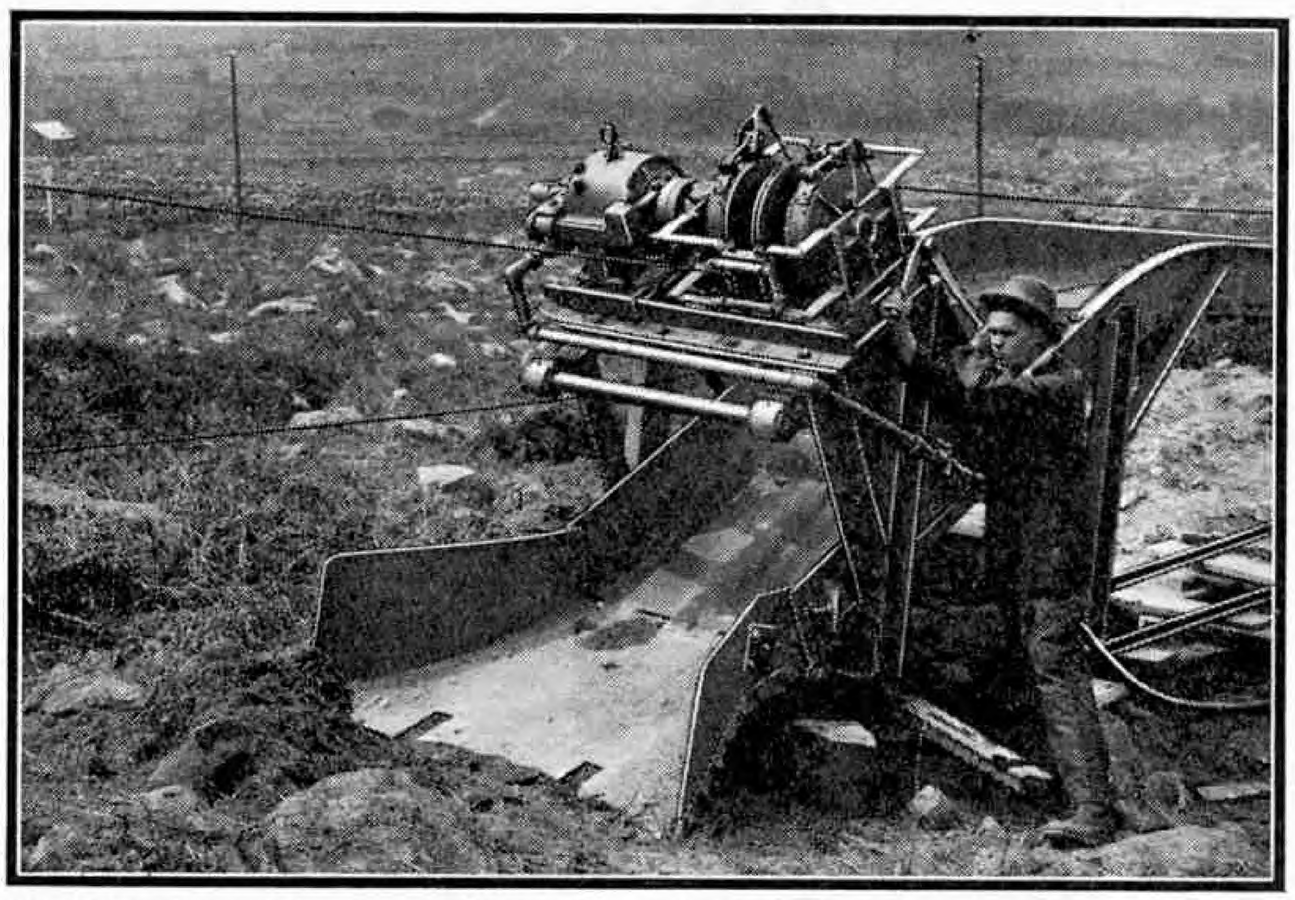
The Holman Scrapeloder

A Combined Digging and Loading Machine

A GREAT part of almost any civil engineering job consists of digging holes in the ground, or excavating, as it is more properly known. Such work is involved in tunnelling, canal and reservoir making, mining, and the sinking of deep foundations for bridges, towers and very large buildings, to mention only a few of the more important examples.

Generally the cycle of operations in excavating work consists of breaking the ground, loading the broken material into trucks for removal, and transporting it away from the working site. Modern excavating machines, such as steam shovels, rock drills and pneumatic picks, work at a very high speed, and by their aid all kinds of ground from the hardest rock to the softest clay can be broken quickly and efficiently. No matter how rapidly the excavating appliances work, however, all the advantage thus gained is lost unless some equally efficient means is available for removing the material from the site.

In the making of a tunnel, for example, the working face is attacked by putting in shot-holes and blasting with explosives, by pneumatic picks and spades, or by other appliances. The spoil, or broken material, lies where it falls, and unless it is removed quickly it hampers further work at the face. The same problem arises in coal and metalliferous mining, particularly when the deposit is not steeply inclined.



The Holman Scrapeloder at work stripping the overburden from the top of a quarry. The hauling winch is mounted on an inclined slide up which the loaded scrape is hauled to discharge its contents. For our illustrations we are indebted to Holman Bros. Ltd., Camborne.

Sometimes the material is loaded on to belt conveyors, which carry it away to a dumping point or load it into trucks. Some conveyors are provided with their own digging element, which digs into the broken material and loads it on to the conveyor belt, but more often the material has to be loaded by hand. A power shovel is capable of doing much of such work quickly. Even the smallest types of these usually are too large and heavy to be used in the confined places often met with in excavation work, however, and a further disadvantage is that they are rather costly to operate and maintain in good repair, and require a certain amount of skilled attention.

A device that is often used for removing broken or loose material in tunnelling, mining and similar work is the scraper. This consists of a scoop or scrape of special form, which is hauled backward and forward over the material to be moved by means of wire ropes attached to the barrels of a winch. When drawn forward the scrape digs into the material and fills itself, after which it continues to travel forward until it reaches the discharging point, where its contents are delivered either down a chute into waiting trucks, or on to a conveyor of some kind. The hauling winch is then reversed and the scrape travels back for another load.

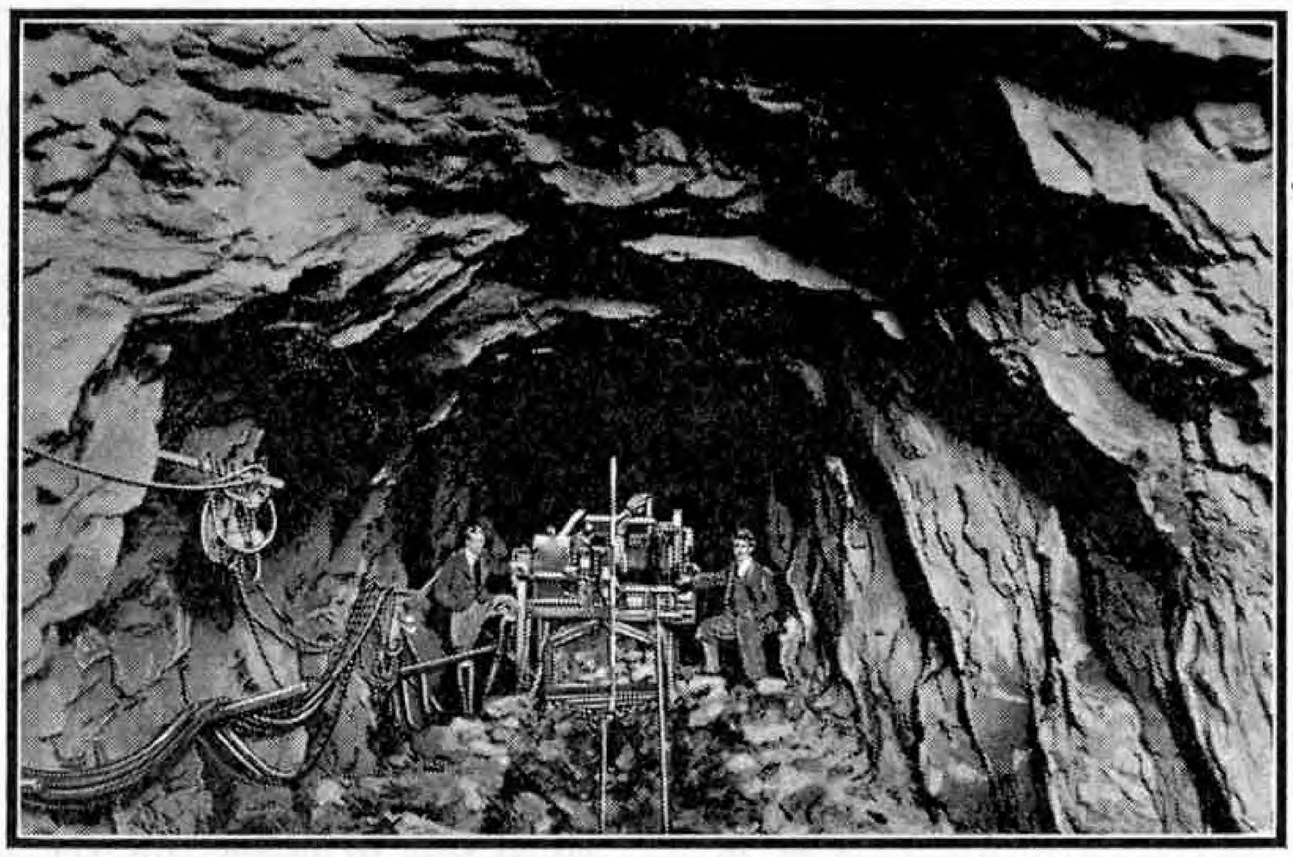
The out-haul rope, by means of which the scrape is pulled backward, is attached to the rear end of the scrape. It passes round a sheave mounted on a tail post or suitable anchorage and is led back and attached to one drum of the winch. Scraper apparatus of this kind is shown in action in the illustrations on this and the opposite pages. The apparatus illustrated is manufactured by Holman Bros. Ltd., Camborne, and is widely used in connection with many different kinds of excavation work both above and below ground, and can be adapted to meet varying requirements.

This firm make also a special combination of scraper and loading device known as the Scrapeloder. In this the winding winch is mounted on a stoutly built steel framework or loading slide, at the front of which is a steel ramp that leads upward to a horizontal discharging platform. When the plant is in action the scrape is hauled forward and up the ramp until it reaches the discharging platform, where its load falls through an opening into a waiting truck. For use in tunnel construction and similar work, where it is necessary to move the scraping plant forward as work proceeds, the Scrapeloder is mounted on flanged wheels that run on tracks. Clamps are provided on the undercarriage for the purpose of clamping the Scrapeloder securely in position while working.

The Scrapeloder has many applications above as well as below ground. Besides collecting, conveying and loading material it is possible to employ the scrape for digging. In surface mining and quarrying, it is frequently necessary to remove an overburden or surface layer, consisting usually of soil, before the deposit to be worked can be reached. Such work can be done by men armed with picks and shovels, but this method is costly and it has been found more economical to employ power operated scraper plants, which not only strip off the material but also convey it to a dump or discharge it into wagons for disposal. In such work the digging is done by the scrape itself, which is of special design to suit the nature of the ground.

A Scrapeloder stripping overburden from the surface

of a quarry is illustrated on the opposite page. In this case the Scrapeloder is actually making its own road up the hillside. It was first secured to temporary rails and then set to work to scrape away the soil and rubbish for some distance ahead. Another length of track was then laid in front of the plant and the scrape made fast to an anchorage. The winch was then set in motion to pull the Scrapeloder along the ground a sufficient distance to enable it to work on a new area.

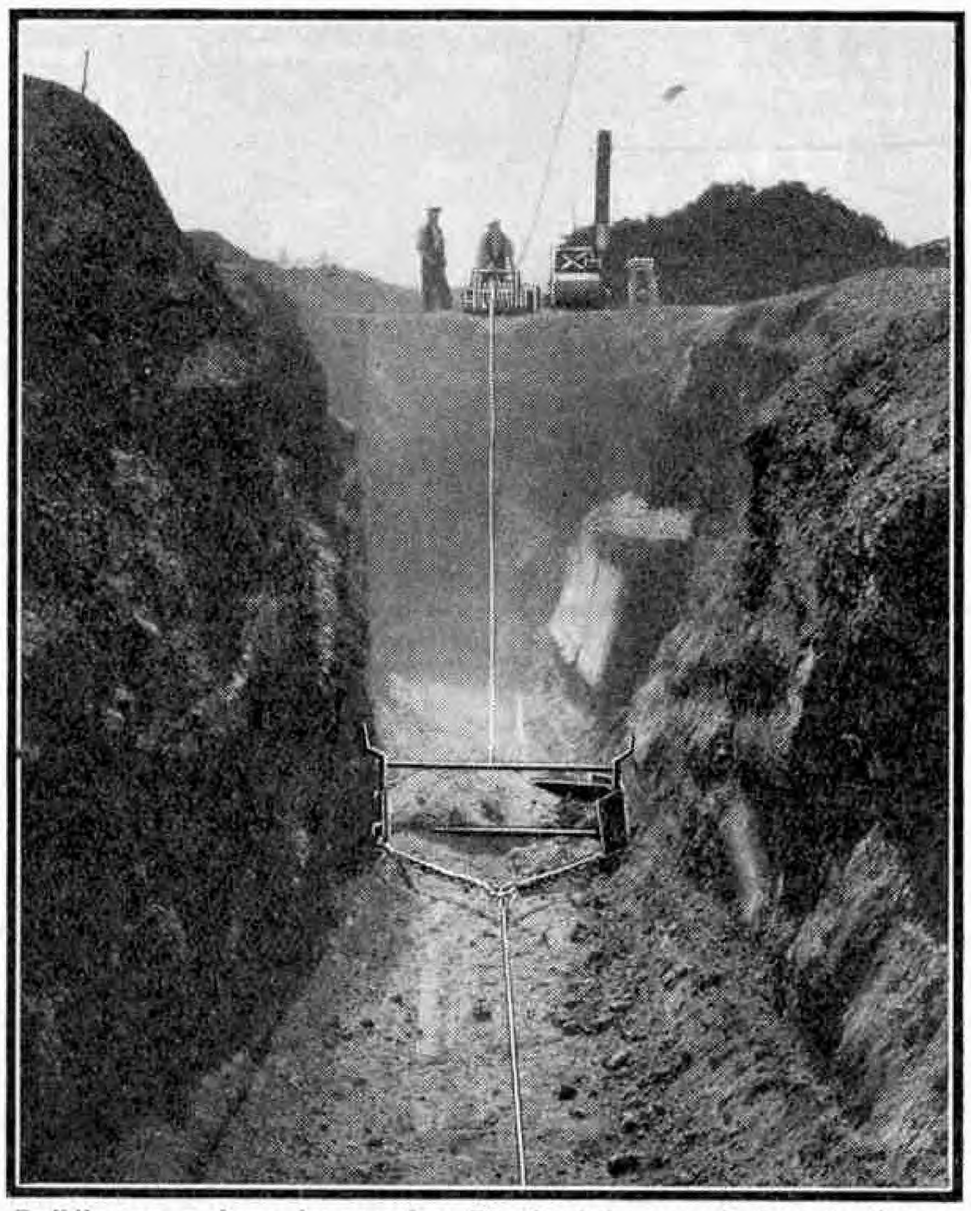


The Scrapeloder has many applications in underground excavating. It is here shown at work in a tunnel for a large hydro-electric scheme.

Another application of scraping that involves digging, as well as conveying and delivering, is frequently necessary in sand and gravel pits. In many cases the sand and gravel has become more or less consolidated, and although it has not become rock, it has formed hard masses that can only be broken down with considerable effort. Sometimes these masses are so hard that blasting is necessary, but generally they can be removed efficiently by scraping alone.

The usual method of working in such a case is to arrange a series of sheave anchorages at suitable points on the side of the pit opposite to the winding winch. With the tail rope threaded through a sheave on one of these anchorages, the scrape is drawn to and fro across the deposit. On its forward journey it digs into the material, and the load it gathers is conveyed to the discharging point. The depth of the trench that can be made in this way depends on local conditions and the nature of the deposit, but may sometimes be as great as 20 ft.

When the most suitable depth has been reached, the path of the scrape is changed by shifting the tail sheave to the next anchorage. The whole area is trenched by repeating this process, and the intervening walls are then broken down and scraped away, after which a fresh start is made and the deposit worked still deeper.



Building up a dump by scraping. The loaded scrape is just starting on its journey to the summit of the dump.

Another interesting use for scraping is that of building up waste dumps or stock piles of materials. The lower illustration on this page shows a Holman scrape in action on work of this kind. The scrape is hauled by a 35 h.p. Holman Scrapehauler, and in the illustration has gathered its load and is commencing its journey to the summit of the dump. With the installation shown 150 to 160 tons of waste material can be disposed of each day, and the scraping distance at the time the photograph was taken was 90 yds.

Instead of building dumps, scrapers are sometimes used to remove existing dumps from one site to another. In one such task undertaken recently a hillock of limestone about 120 ft. in height had to be moved into an adjacent hollow. A Holman Scrapehauler, driven by a 35 h.p. electric motor, was fixed at one side of the hollow, and a $1\frac{1}{4}$ in. diameter wire rope was anchored at both ends and at intermediate points to trees behind the dump. This rope carried the tail sheave. During the first day's working and before the workmen properly understood the equipment, 500 tons of material were moved a distance of 45 yd. in $7\frac{1}{2}$ hrs. As the height of the dump decreased and the hollow filled up, the quantity shifted each day was even greater.

Considerable extension of the field of usefulness of scraper plants has been made by a system of three-drum working developed by Holman Bros. Ltd. Before the introduction of this system, the time required to alter the direction of movement of the scraper was considerable, and the work had to be interrupted to change the position of the tail-rope anchorage. The three-drum system, however, enables the line of traverse of the scrape to be varied over a wide range and with little delay, by a single operator stationed at the hauling gear.

In this system the hauling gear has three independently-operated winding drums. One of these effects the inward movement of the scraper, whilst another provides the outward movement, the two drums being so manipulated that the rope is paid out and gathered up without slack. The remaining drum operates a third rope by which the position of the tail rope can be varied. The tail rope is not attached to an anchorage, but passes over a travelling sheave.

The third rope drum is held stationary until it is desired to alter the path of the scrape, and the other two drums are operated so as to give the usual forward and backward traverse to the scrape. To change the path of the scrape the drum holding the third rope is set in motion to wind in the rope. This causes the travelling sheave to which the tail rope is attached to move to the right until it is in the correct position for the new line of traverse. The area is thus cleared by successive cuts.

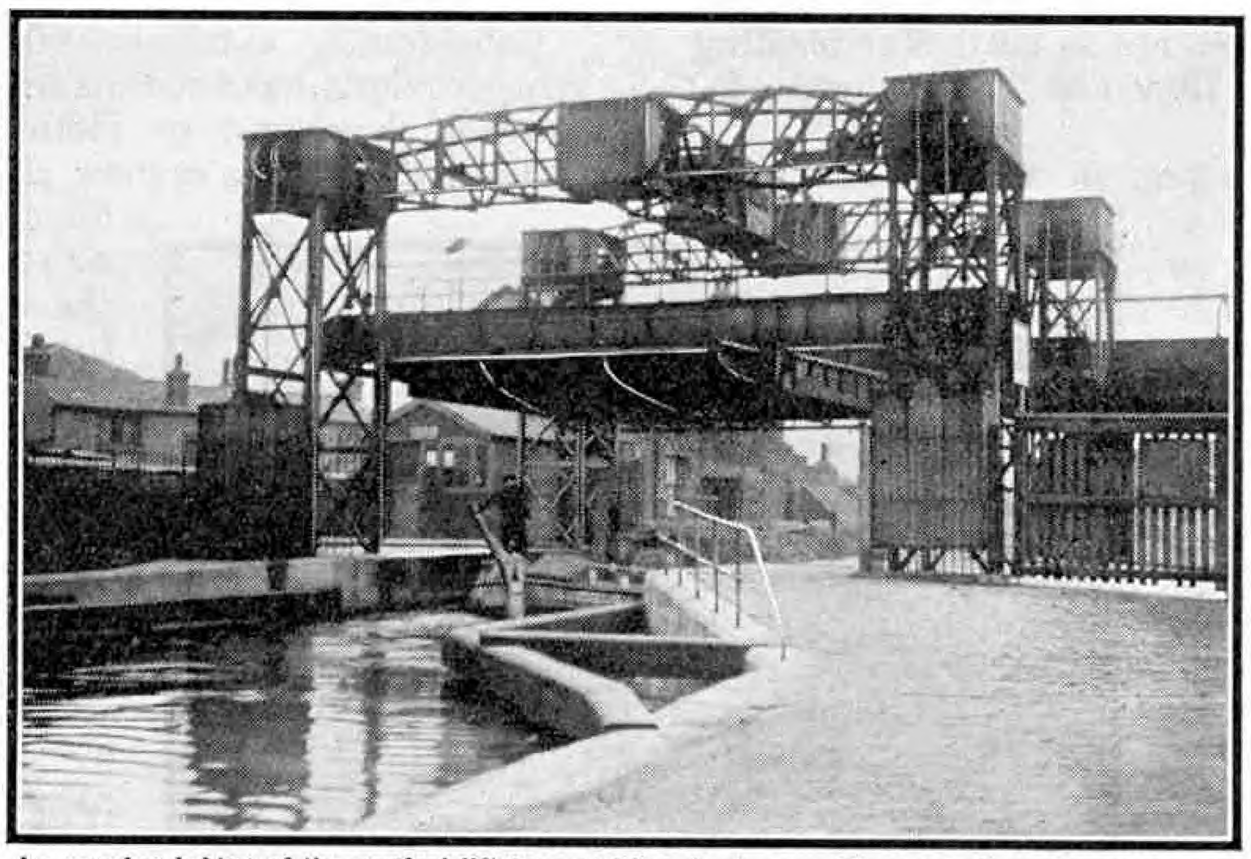


These pages are reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

An Unusual Type of Canal Bridge

The illustration on this page shows an interesting opening bridge spanning the Leeds and Liverpool Canal at Litherland, near Liverpool. It was constructed a few years ago to replace an old wooden swing bridge that had become unsuited to the requirements of present-day traffic. The new bridge is of the vertical lift type, of which there are few in Great Britain, although there are many larger bridges of this kind overseas.

The movable span of the Litherland bridge is raised and lowered electrically, and its movements are controlled from a cabin on the bank of the canal. It is counterbalanced by four cast iron weights, placed at the corners of the framework, that are suspended from steel cables passing over pulleys at the top of the superstructure. A modern traffic control system is installed. A warning bell is rung when it is desired to close the bridge to road traffic, signals show red lights, and barriers descend across the roadway. These cannot be opened until the lift span has been lowered into position.



An opening bridge of the vertical lift type at Litherland, near Liverpool. It carries road traffic over the Leeds and Liverpool Canal. Photograph by R. A. Roberts, Liverpool.

R. A. ROBERTS (Liverpool).

Chased by My Own Aeroplane

My first attempt at a solo flight was made many years ago in a Curtis biplane. After receiving final advice from my instructor, I taxied to the centre of the aerodrome for my "take-off." As I turned the machine into the wind the engine suddenly ceased firing. In these circumstances it was my duty to yell for a mechanic to start the engine again, but wishing to create a good impression, I decided to swing the propeller myself. I adjusted the throttle lever into a position I considered most suited for the engine to "tick over" gently, and then gave the propeller a hefty swing into life. There was too much life, in fact, for the throttle lever had been advanced too far and the aeroplane started to move forward.

Dodging the whirling propeller, the slightest touch from which would have meant serious injury or death, I dashed round to the cockpit in a frantic endeavour to climb aboard the machine as it gathered speed. At the crucial moment I stumbled, and as I fell the tail of the machine struck me a vicious blow at the back of the head. Then the fun started.

Temporarily dazed but determined at all costs to get into the machine again, I chased my own aeroplane across the aerodrome. This was sufficiently unusual, but worse was to follow, for the machine suddenly veered round and, to my consternation, started chasing me! Round and round we went for what seemed an interminable dance. Dodging the machine like a toreador evading the mad rushes of the bull, I really thought my end had come when at last it made a larger circle and again came tearing down upon me. It gained speed and when it was only 50 yards away, it actually took off, and to my amazement flew gracefully over my head. After flying a considerable distance it suddenly nose dived and crashed into the ground, becoming a total wreck. Thus an untimely end was miraculously averted. Friends who were watching thought the affair a huge joke, but it was some time before I was able to see the humour of it. F. D. SILWOOD (Ipswich).

Crossing the Austrian Alps by Car

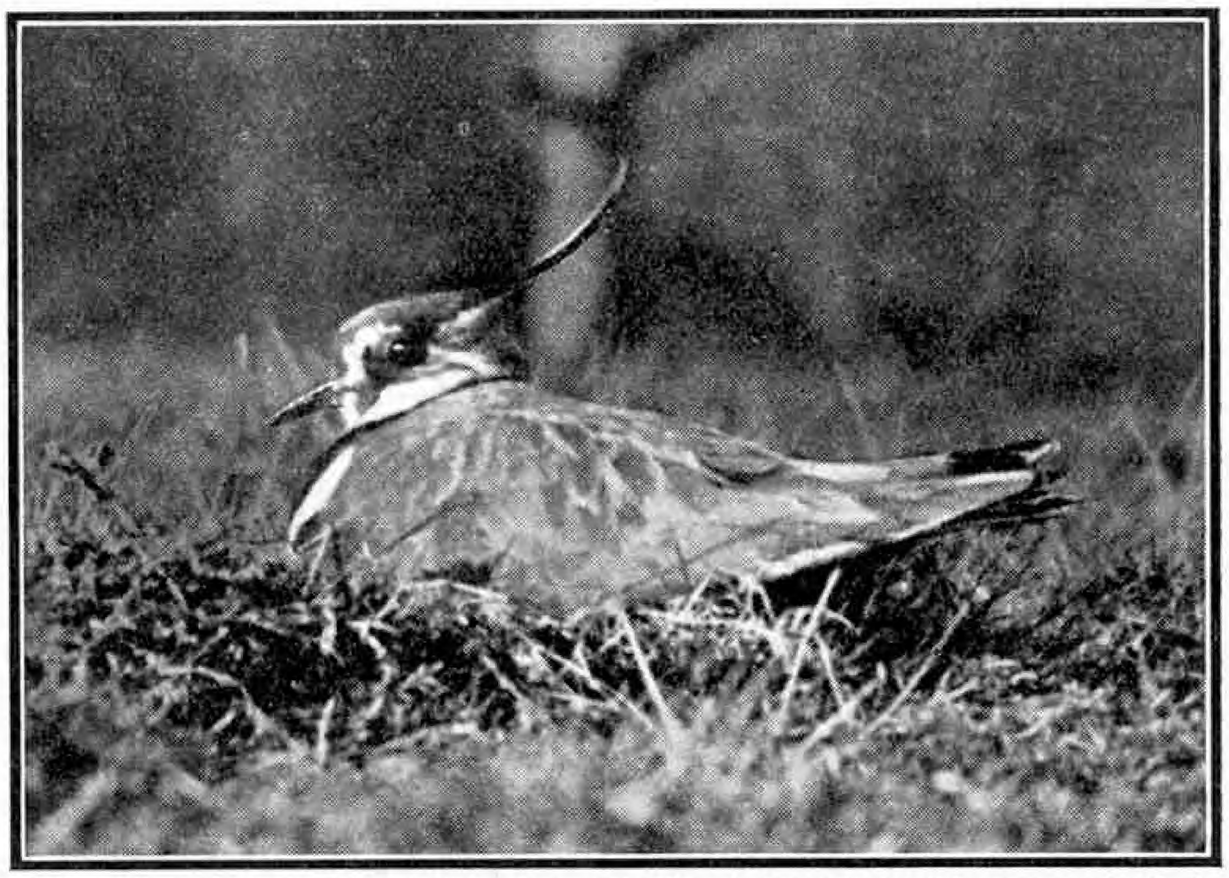
Last summer I had the unforgettable experience of crossing the Austrian Alps by the Gross-Glockner road. This is Europe's second highest motor road, and is named after the nearby Gross-Glockner mountain.

We started early on a fine September morning from the southern, or Carinthian side, going along a gently rising road in a valley. Soon we came to the village where the Alpine road begins, and after paying toll we started up the hillside, rounding a spur of rock. At the top of the first part of the climb we ran into a mist that enveloped us until we reached the summit of the road. This is in a tunnel, and lies on the state boundary between Carinthia and Salzburg.

As we came out of the tunnel on the other side we saw a marvellous panorama before us of glaciers, snowy mountain peaks, streams and waterfalls. We then coasted down the hill into the valley. J. COSGROVE (Marlborough).

Birds of the Marsh

The study of marsh birds is one of the most interesting branches of bird watching. We know of a certain marsh beside the estuary of a small river, where on one afternoon we saw many birds that are not rare, but are not often seen. The first of these was a male reed bunting, easily recognised by his black head and throat, with an intersecting white stripe. He was perched on the topmost sprig of one of the alder trees, repeating his monotonous little song, whilst he swayed in the breeze. Soon his song ceased, and shortly after he left his perch and flew some distance over the tops of the reeds. After hesitating a little while he disappeared into a small clump. A few seconds later the female flew out and alighted on an alder, where she began to preen herself. The female, although not a drab-coloured bird, is not nearly as handsome as the male. Her back and head are a rufous brown, with yellowish streaks above and below the eye. In flight she shows white on her outer tail feathers. We decided to have a look at the nest. This was placed at the base of the clump of reeds, and was so shielded that it was impossible to see it from the outside. It was built of reed stems, lined with dark horse hair, and contained four eggs.



A lapwing on her nest, which contains four eggs. The photographs on this page are by G. A. Coaker and H. G. Bruce, Portishead.

Close by a pair of sedge warblers had their nest, slung on three stems in a clump of meadowsweet. This also contained four eggs, and the birds were so tame that it was possible to approach within a few feet of the nest without disturbing them. The sedge warbler is one of the smallest British warblers, but it cannot be confused with any other members of its family as it has a very conspicuous yellow stripe above the eye. The general colour of the back is reddish brown, growing darker towards the head.

Here we discovered a nest of the lesser whitethroat containing three eggs. The nest itself was slung by basket-like handles from reed stems.



A close-up view of the nest of a moorhen.

Penetrating further into the marsh, the mingled cries of redshank and lapwing filled the air, as they quickly left their nest. A close sitting snipe hurriedly got up from her four eggs concealed in a tuft of grass. After a short interval in hiding, a lapwing was seen to run to her nest. We set up a hide, and eventually obtained the photograph reproduced as the upper illustration on this page.

G. Coaker and H. Bruce (Portishead).

Mill Driven by the Tide

Mills driven by the tides were once common on the East Anglian coast. Most of these have been abandoned as too unreliable and unsuitable for modern requirements, but at Woodbridge-on-the-Deben, in Suffolk, there is a tide mill that is still in constant use.

The momentum of a large mass of quickly-moving water is the source of energy in this type of power production. The method of working is simplicity itself. The River Deben, like most East Anglian rivers, is at low tide a narrow stream winding down to the sea between mud flats. At full tide a broad area of comparatively shallow water extends from its mouth as far as Woodbridge. The mill is on the bank of the river, and behind it a large, shallow pond, several acres in extent, has been banked off. A sluice is opened when the tide starts to rise, and the incoming water flows into the pond, the depth of which at high water often reaches 3 ft. or 4 ft.

As soon as the pond is full, the sluice is closed, and then it is necessary to wait until the tide has fallen low enough to allow the mill to be worked. By half tide the sluice leading to the mill-race can be opened, and the wheel is then turned by the water running out of the pond. The wheel of this tide mill is of the "undershot" type, about 20 ft. in diameter, and built of wood. The water strikes the buckets of the wheel, causing it to rotate, and then flows away to join the river at a lower level. The wheel drives the milling and grinding machinery in the usual way.

The mill is a well-known landmark in the district, and is a favourite subject with artists on account of its old-world appearance. Oil lamps are still used to illuminate the interior.

It need scarcely be pointed out that the method of producing power by tide mills has many disadvantages. The chief of these is that the mill can only be used at certain periods of the tide, and once the pond is empty, there is necessarily a period of idleness. On the other hand little attention is required during operation, and running costs are negligible. It is hoped that this mill will remain in its typical old-world setting for many years, during which time it will be a treasure for the artist and an object of interest to the modern engineer.

G. R. Stocks (Helensburgh).

In Search of New Models

Motor Cycles and Tri-Cars

MODEL-BUILDERS in search of new subjects will find opportunities for experiment in the many different kinds of motor cycles and tri-cars now popular. There is sufficient variety in the appearance and details of these machines to keep a keen model-builder occupied for many months, and reproducing their main features in miniature form is really good fun. From the model-builder's point of view one of the most pleasing features of models of this kind is the great amount of detail they incorporate. This provides an excellent test of a model-builder's skill and neatness in workmanship, and the selection of suitable Meccano parts to reproduce the various items is itself an interesting pastime.

A start should be made with one of the more simple types of motor cycles, such as a light-weight single cylinder machine. Construction should begin with the frame. For a simple machine this is quite easy to build from Rods or Strips, joined together by Couplings, and there should be no difficulty in completing this portion satisfactorily. It is best to construct the forks from Rods, but if sufficient of these are not available Strips may be used and in most cases will prove satisfactory. The next step is to fit in the details of the engine. The cylinder can be represented by a Chimney Adaptor and a $\frac{1}{2}$" fixed Pulley, or if the model is on a scale sufficiently large, 1" loose and fixed Pulleys fastened to a short Rod will be found suitable. Handlebars can be represented either by Strips or short Rods, fastened together with Couplings, and the Bowden controls for the clutch, ignition and brakes should be represented by Spring Cord. Items such as headlamps and number plates may be added to give a finishing touch.

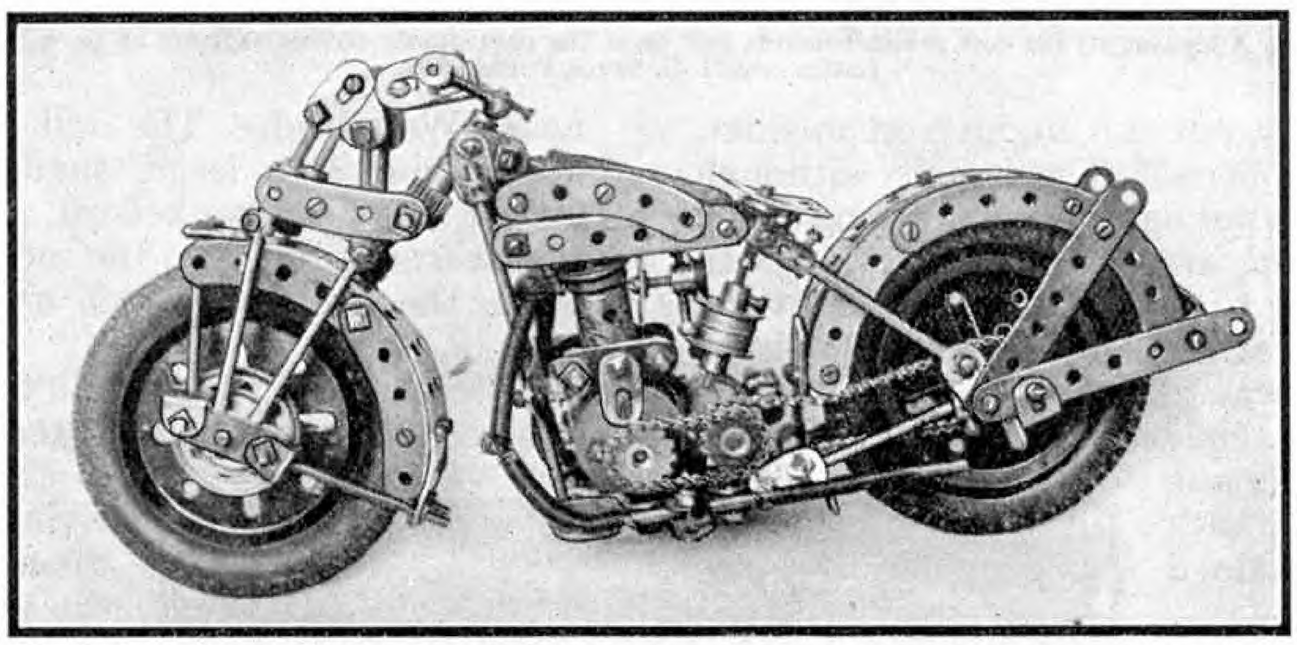


Fig. 1. A good example of a Meccano model motor cycle. It was built by L. Paris, Orleans, and includes a great amount of interesting detail work.

If sufficient parts are available to build one of the larger types of motor cycles, it is a good plan to select a prototype fitted with water-cooled cylinders. One well-known machine of this kind has twin cylinders, which are placed side by side in a sloping position in the frame with the radiator in front of them. In other equally popular machines the cylinders are placed horizontally on each side of the crankshaft, which lies crosswise in the frame. Usually the cylinders are placed very low in the frame, and for reproducing them on a small scale Sleeve Pieces, wide-faced Pinions or Worms are suitable.

Another motor cycle that makes an excellent subject for a model is the B.M.W. twin-cylinder machine, in which the rear wheel is direct driven by means of a shaft instead of the more usual chain transmission. The powerful four-cylinder machines designed for sidecar work also can be reproduced with good effect. In the latter the cylinders are generally set in square formation and work in pairs on two separate crankshafts, which are geared to a central transmission shaft.

The attractions of a motor cycle model are much greater when it is capable of moving under its own power. Those who wish to make a working model will find the Magic Motor suitable for use as the power unit. If this is used it is best to place it in a flat position in the lower part of the frame as this location will enable a dummy engine to be built above the Motor to give a realistic appearance. Extension pieces consisting of $\frac{1}{2}$" loose Pulleys attached to Reversed Angle Brackets may be placed on each side of the completed model to prevent it from falling over. The model can scarcely be expected to run along a straight track, but it can be attached to the end of a long Strip arranged to revolve round a central pivot, in a similar manner to the Revolving Cyclist (Model No. C82) described in the Instruction Manual for Outfits O/E. The effect of an arrangement of this kind is excellent, and the idea will suggest other interesting models.

No matter what type of motor cycle is chosen as a subject however, careful and neat constructional work is essential to secure a realistic appearance. An excellent example of a good type of construction was illustrated on the *"Competition Results"* page of the January 1937 *"M.M."* An alternative method of constructing the framework is shown in Fig. 1. In the model illustrated the frame is made of Rods and Strips of various lengths used in combination. Strips are used also to support mudguards constructed from $2\frac{1}{2}$" large radius Curved Strips.

A point that should be noted in this model is the petrol tank, the curved shape of which is produced without bending the Meccano parts used in its construction. Another good method of reproducing a petrol tank is to use one of the Engine Casings included in the Meccano Aeroplane Constructor range of parts. Examples of the use of the Engine Casing were given in the *"M.M."* for June 1933.

For the exhaust pipes Rods bent to shape, or Flexible Couplings and Springs may be used. Pipes of larger diameter can be made by threading Washers on to Rods, and such a pipe may be used in conjunction with a silencer made from Couplings or Chimney Adaptors.

A model motor cycle representing a large and powerful machine may be fitted with a sidecar. Real sidecars usually are mounted on a triangular steel frame, but in some cases the frame is rectangular in shape. Rods and Couplings will enable a suitable frame to be built

up easily. When this is completed it will be necessary to devise some form of "springing," but before commencing this part of the model it is best to inspect one or two actual sidecars and observe how the springs are designed and disposed. In a model the springs can be represented by Strips or by Springs curved to shape and bolted to the part it is required to support. Model-builders who do not possess sufficient Springs will find that Spring Clips clamped between the ends of Strips work quite satisfactorily.

The design of the sidecar of course will depend on the wishes of the model-builder, and on the quantity and variety of parts available for its construction. A pleasing streamline body can be reproduced with the aid of Flexible Plates bolted to a light framework of Strips. Boat-shaped bodies are easier to construct, however, and model-builders are advised to tackle this type first, and to leave the streamline variety for a later attempt.

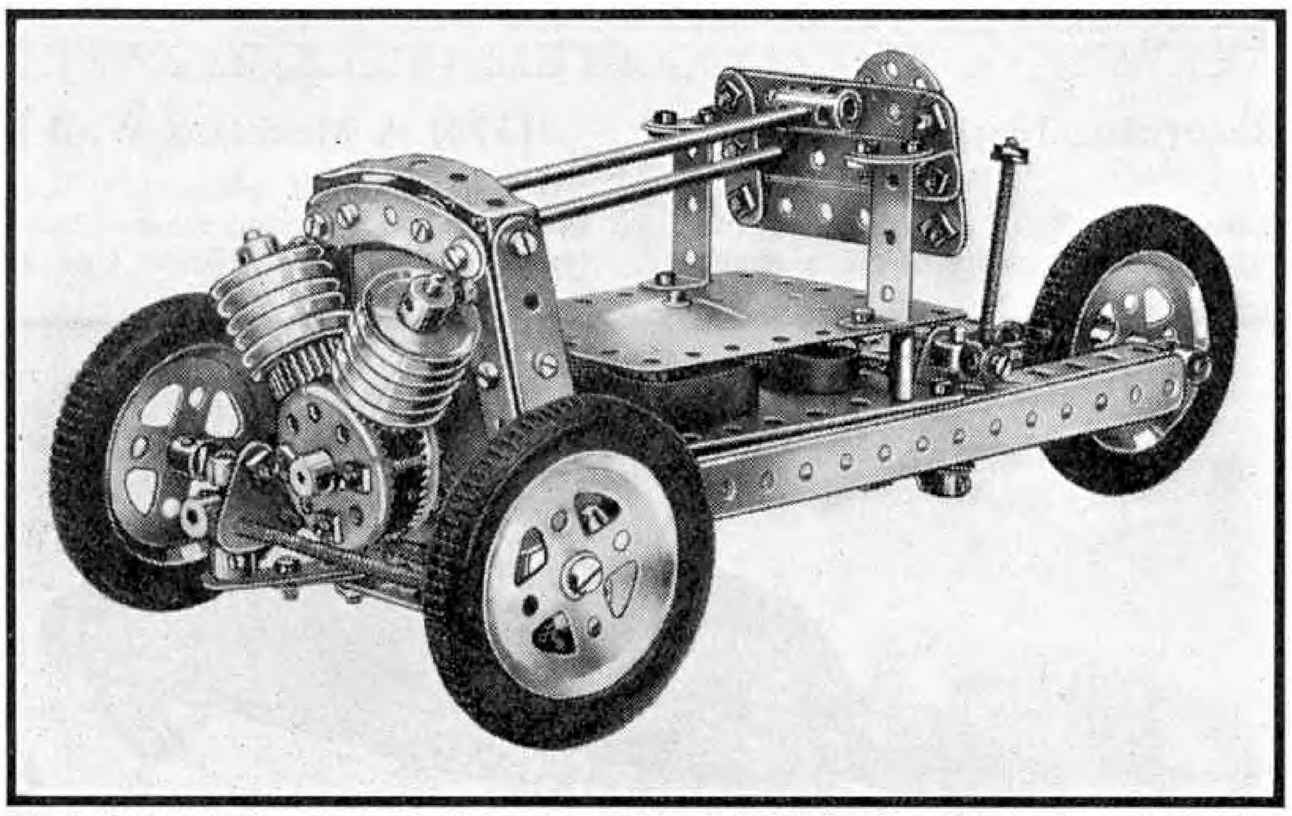


Fig. 2. A chassis for a three-wheeled motor vehicle. It is fitted with a two-speed gear-box and a No. 1 Clockwork Motor.

Three-wheeled motor vehicles, or tri-cars, which are really a development of the combination motor cycle and sidecar, also provide good subjects for models. Because of their low initial cost and the fact that they are cheap to run, these smart little vehicles have become very popular in recent years. A typical example of a simple chassis suitable for a model of this kind is shown in Fig. 2. It is driven by a No. 1 Clockwork Motor and incorporates a neat two-speed gear-box. Most of its constructional details will be clear from the illustration, and model-builders should have no difficulty in designing suitable bodywork.

Most three-wheeled vehicles, of which the Morgan three-wheeler is a well-known example, have two wheels at the front and one at the rear, the latter being driven from the engine. In the Raleigh three-wheeled car, however, the reverse order is adopted, a single wheel being placed in front and two wheels at the rear. This car is capable of accommodating four people and in appearance resembles an ordinary four-wheeler. The body is built on a rectangular chassis and tapers slightly towards the front, and the engine is mounted forward in the usual position. The front wheel is held in forks similar to those used on a motor cycle and is steered from a steering wheel that acts through worm and toothed-segment steering mechanism.

A model of this kind may be driven by a Magic Motor, the drive being taken to the wheel axles through a gear-box incorporating a small ratio reduction gear. Differential gear is not incorporated in light cars of this kind, and Worm and Pinion Bearing, S.M.129, can be used for the rear axle drive. If desired, a clutch and internal expanding brakes can be fitted, but it is best to avoid too much detail as this will make the model too heavy to work satisfactorily with the Magic Motor.

Models of this kind do not require much detail in the coachwork or chassis, and by skilful use of the various parts it is easy to produce a neat model. The addition of a driver and passenger built from Meccano parts will add to the realism of the model, or alternatively, a Driver from a Motor Car Constructor Outfit might be used. If bucket seats are required they should be made from Flexible Plates, as the gold lines on these parts will give an impression of the criss-cross markings on leatherwork.

Light three-wheeled delivery vans have become popular in the last few years as an economical means of transporting light loads. In design they are somewhat similar to a motor cycle combination, except that the front wheel is placed centrally with the rear axle. A model of this type may be fitted with a workable gear-box placed inside the body, and operated by means of a gear lever mounted on the side of the petrol tank. The power unit, which may be either an Electric or Clockwork Motor, also may be concealed in the body.

A three-wheeled delivery vehicle of another type is shown in Fig. 3. This has a flat truck body and does not require quite so many Meccano parts for its construction as the van type. It is driven by a Clockwork Motor, fitted under the platform body, the drive being taken to the rear axle through Worm reduction gearing and Sprocket Wheels and Chain.

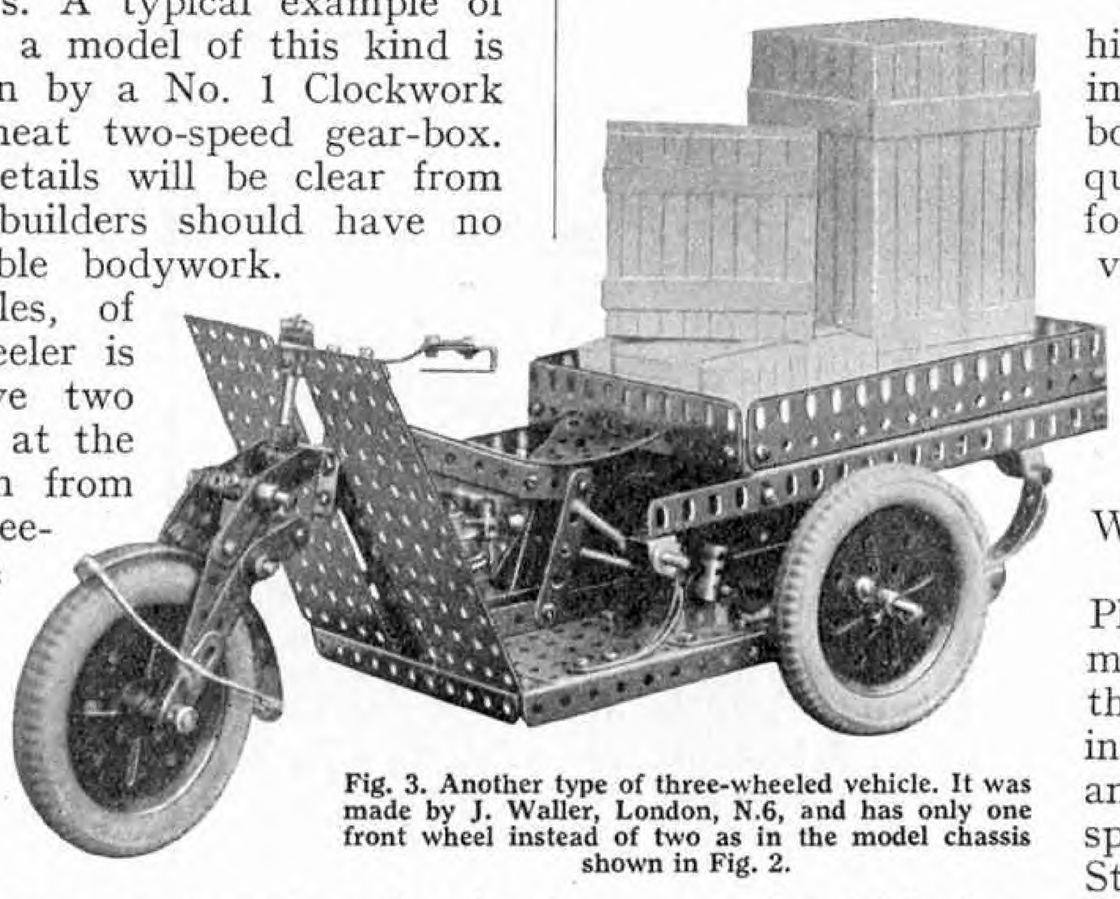


Fig. 3. Another type of three-wheeled vehicle. It was made by J. Waller, London, N.6, and has only one front wheel instead of two as in the model chassis shown in Fig. 2.

The use of Flanged and Flat Plates in the construction of this model is a notable feature; these have been so skilfully incorporated that their appearance is far from clumsy. The springs are constructed from Strips of various lengths and the manner in which they are hinged to the body is interesting. A Double Bracket is fastened to the Springs and others to the underside of the body, so that when a Rod is journalled in them a pivot joint is formed.

The forks are neatly constructed of Strips, and a study of these should enable model-builders to proceed on similar lines if sufficient Rods are not available. Cranks are used for supporting the front axle, and short Strips pivoted together on Rods give adequate springing to the front wheel. The use of wide Meccano Rubber Tyres gives an excellent effect on models.

Meccano Suggestions Section

By "Spanner"

(375) An Electric Recording Instrument

(R. Sayers, Carlisle)

From time to time suggestions have been put forward for instruments for testing and comparing the powers of the various Meccano Electric Motors. Some of these were in the form of dynamometers, and others were simply centrifugal revolution indicators of various types. These were quite successful and could be used for purposes other than that of comparing Electric Motor performances. For instance, R. Sayers, Carlisle, has used the instrument shown in Fig. 375 with success. He designed it for use in conjunction with a model crane, for the purpose of recording the effect of raising various loads one after the other.

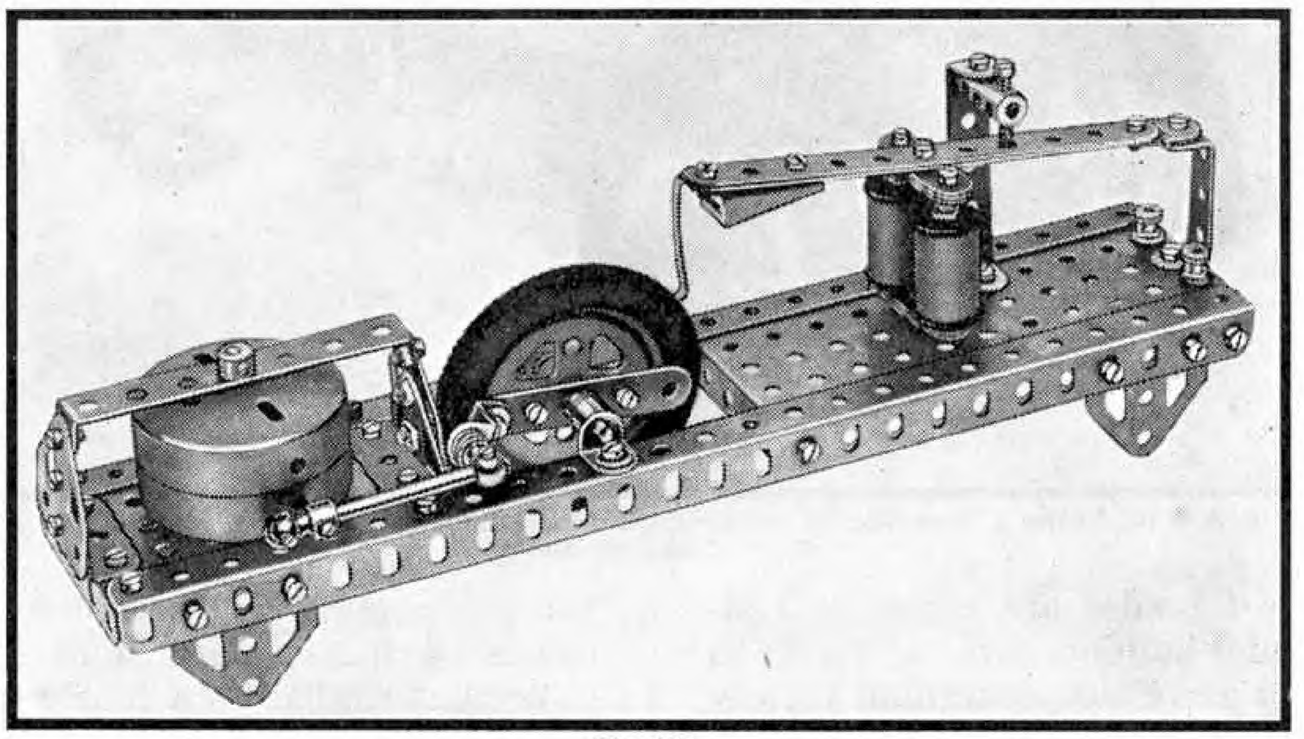


Fig. 375

The main framework consists of 12½″ Angle Girders connected together by a 5½″ × 2½″ Flanged Plate at one end, and by a 3½″ × 2½″ Flanged Plate at the other end. This is supported at each corner by Flat Trunnions. The essential part of the mechanism consists of two Bobbins wound with Elektron 26 Gauge S.C.C. Wire. These are bolted to four 1½″ Strips by means of 2″ Screwed Rods that form the cores of the coils. An insulated 6BA Bolt fastens these to the 5½″ × 2½″ Flanged Plate. The coils are connected in series, that is the end of one coil is connected to the beginning of the other, so that the cores of the coils have opposite polarity. The remaining wires are connected to the insulated terminals.

The lever arm consists of two 5½″ Strips. A cross-piece of four 1½″ Strips is bolted on, and this forms the armature for the electromagnet. A Hinge is fastened to one end of the 5½″ Strips and a Pendulum Connection is clamped at the other end. The hinged end is supported on a 1½″ × ½″ Double Angle Strip. The 2½″ × ½″ Double Angle Strip that holds a Coupling has a ¾″ Bolt in one of its tapped bores, and is used as a stop for adjusting the hinged arm.

In the opening between the two Flanged Plates a 2″ Pulley, fitted with a Rubber Tyre, is supported on a 2½″ Rod journalled in ½″ × ½″ Angle Brackets.

A 2½″ Strip, spaced from the 2″ Pulley by five Washers, carries a Reversed Angle Bracket. To this is fastened a Handrail Support, which is spaced from the Reversed Angle Bracket by further Washers. A 2″ Rod held in the Handrail Support carries a Handrail Coupling. This is used to hold the pen. Two Boiler Ends, held together by a 2″ Screwed Rod form a drum on which the record is made by the pen. This drum is free to turn in the bearings, one of which is the 3½″ Double Angle Strip supported by Trunnions and Flat Trunnions bolted together. A piece of squared paper is fixed round it, and it is turned by a Clockwork Motor. For the sake of simplicity this has been omitted, but it can readily be arranged to drive the drum through a suitable Worm gearing. The pen consists of a piece of glass tubing drawn to a point, and filled with ink. It should be adjusted so that it bears very lightly on the paper so that there is as little friction as possible. The hinged arm is balanced with a weight so that the pen arm is slightly heavy.

(376) A Meccano Wall Light **(P. Stamford, Accrington)**

The problem of adequately lighting rooms and halls and yet avoiding brilliant concentrated light is always occupying the attention of the lighting experts. One way of overcoming the difficulty consists in the use of frosted electric light bulbs, but something that was less harsh to the eyes was desired and this was achieved by passing the light through a corrugated or frosted glass screen to diffuse the light more. Modern houses are now fitted with wall lights fitted with specially treated glass, and this form of lighting is found to be more restful than the use of electric light bulbs in the ordinary manner.

In the *"With the Model-builders"* pages, in the January 1937 *"M.M."* reference was made to the use of the Glass Rods included in the Kemex range for obtaining this effect. The possibilities in this direction attracted many model-builders and among some of the novel designs that have been put forward are wall and table lamps with curved fronts and diamond-shaped table lamps.

The simplest, and perhaps the most attractive of the wall lamps, was one suitable for hanging from the picture-railing in a corner. This was designed by P. Stamford of Accrington, and is shown in Fig. 376. Its neat appearance is evident from the illustration, and the lamps should be of interest to those model-builders who have not been so successful in their attempts.

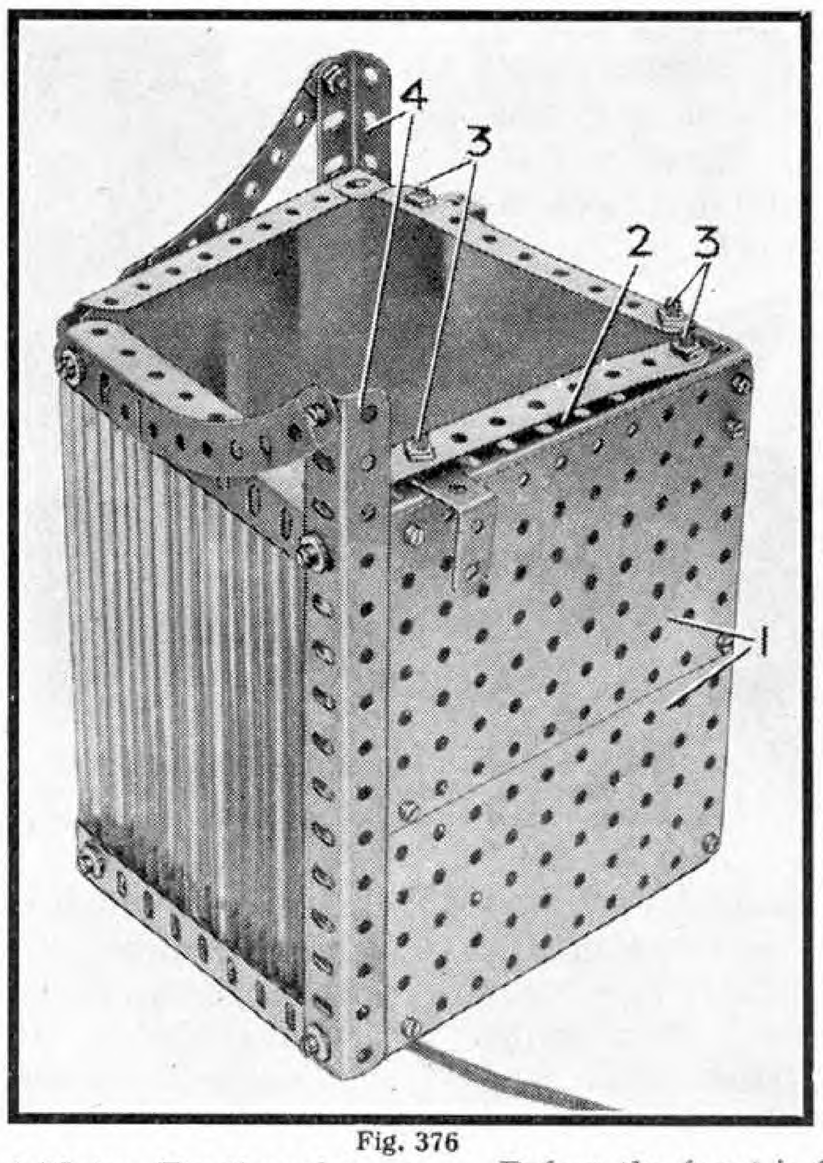


Fig. 376

The main framework of the lamp is built up of 5½″ Angle Girders, two of these being bolted together at right angles to each other, and the third is fastened in a vertical position at the joining. Two 5½″ × 3½″ Flat Plates 1, overlapping two rows of holes on their longest edges, are bolted on each side, and to their upper edges are fastened the two 5½″ Angle Girders 2. These have ⅜″ Bolts 3 lock-nutted to them. The base is fitted in with two 2½″ × 2½″ Flat Plates and one 4½″ × 2½″ Flat Plate bolted together to form a square, and attached to the 5½″ Angle Girders.

The front requires care and patience, because some of the Glass Rods must be cut to provide space for the clamping bolts. Two 2½″ Strips are bent to an angle of about 105 deg., and two 4½″ Angle Girders are attached to each of these. Further 4½″ Angle Girders, having Driving Bands stretched round them in order to prevent the Glass Rods from chipping, are attached to the previously mentioned 4½″ Angle Girders by ½″ Bolts, the end Bolts also being used to hold the 7½″ Angle Girders 4. The Glass Rods are fitted, eighteen on each side, and one in the centre, and the ½″ Bolts are tightened carefully.

Before the front is fitted to the main framework, a piece of plywood, cut to shape and having a bulb holder connected to a flex bolted to it, is wedged in position. A piece of sheet tin curved and bolted to the Flat Plates 1 serves as a reflector for the bulb. The front is then pushed into place. No bolts are required to hold it in position. A piece of coloured celluloid fixed over the top of the bulb, is held down by 4½″ Strips fastened by nuts to the ⅜″ Bolts 3.

(377) Meccano Scissors and Cutter (L. Saunders, Chester and J. Clayton, Baildon)

Meccano parts are useful for many purposes in addition to model-building. They are particularly useful in the home and many interesting articles that have been built from Meccano parts have appeared in "*Suggestions Section.*" Two new gadgets of this kind are shown in Figs. 377 and 377a which illustrate novel ways of using old razor blades.

The Meccano scissors made by L. Saunders of Chester and suitable for light work, are built mainly of $2\frac{1}{2}$" Curved Strips. Two pairs of these are joined together at one end by Flat Brackets, and $2\frac{1}{2}$" large radius Curved Strips are overlapped three holes and bolted to the Curved Strips that form the handles. The Curved Strips, to which the Flat Girders that hold the razor blade are attached, are spaced from the Curved Strips by means of Washers, and the two halves are pivoted on a $\frac{3}{8}$" Bolt. The razor blades are held between 2" Flat Girders by bolts passed through the slotted holes. These allow the blades to be adjusted to the correct angle. The blades must also be carefully adjusted laterally.

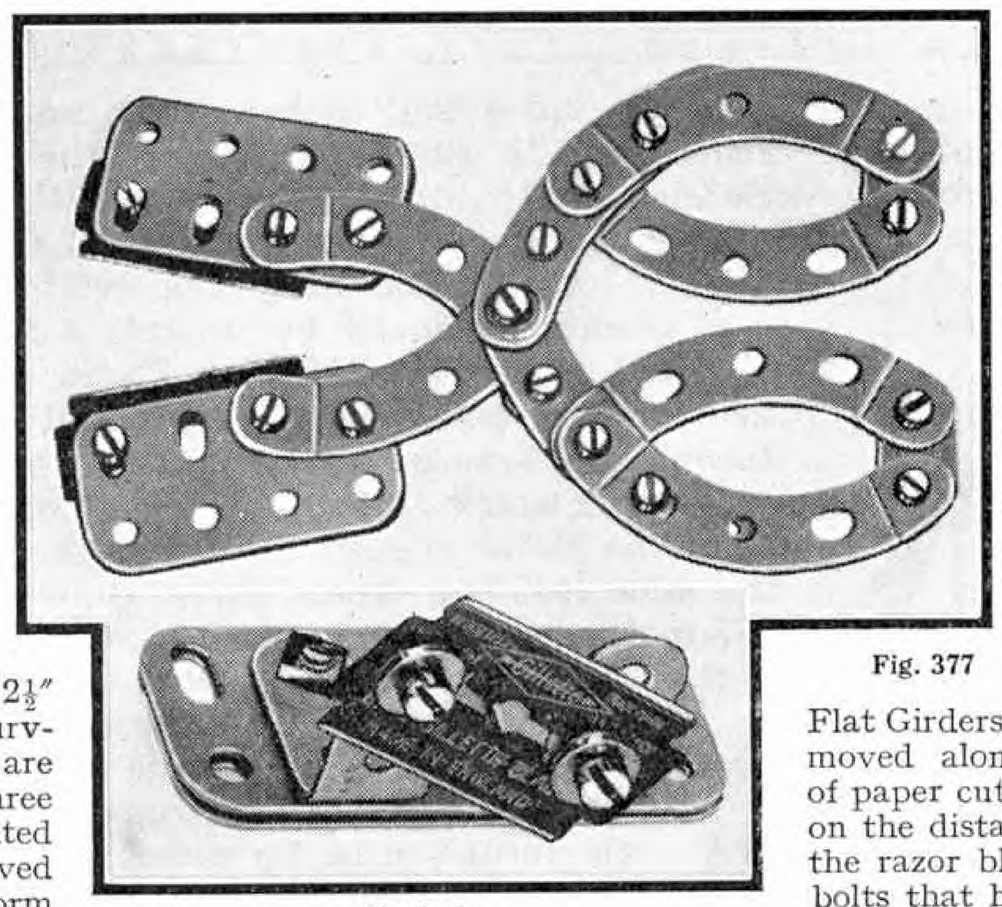


Fig. 377

Fig. 377a

A useful tool that should be of interest to amateur paperhangers, and which will save a great amount of time, was submitted by J. Clayton and is shown in Fig. 377a. It is used for stripping the selvedge, which is a tedious operation when done with scissors. The tool consists essentially of two 2" Flat Girders spaced apart by a Washer on each of the bolts that hold the $1" \times 1"$ Angle Brackets in place. A razor blade is held in place by bolts as shown. To use the cutter, the paper is fitted in the narrow groove between the Flat Girders, and the tool is moved along. The width of paper cut off depends on the distance between the razor blade and the bolts that hold the Flat Girders together.

Another useful tool (not illustrated) submitted by L. Saunders consists of two $2\frac{1}{2}$" Triangular Plates fitted with a handle of Strips at one of the apexes of the triangle. Between the two Triangular Plates is clamped a razor blade and the complete tool forms a handy scraper. Two layers of Meccano Cord are wound round the handle to provide a comfortable grip.

(379) Creeper Track (M. Morris, Burnley)

The construction of realistic creeper tracks using a minimum number of parts has always been a problem with Meccano enthusiasts. Suggestions have been made for creeper tracks built from Strips and using Sprocket Wheels and Chains, but the model-builder is apt to find that most of his Strips have been used up before he has made a track of the desired length. This method therefore is not suitable for owners of small Outfits.

A neat form of track that is suitable for use on medium-sized models, and to which this drawback does not apply, is shown in Fig. 379. It has been devised by M. Morris, Burnley, and will appeal to those with a limited number of parts. Two Driving Bands are threaded through the holes in Flat Brackets and held in place by short lengths of wire; Hornby Connecting Wire is used in this case. The complete track is fitted so that the Driving Bands fit in the grooves of the 1" Pulleys fixed on $1\frac{1}{2}$" Rods that are journalled in the $2\frac{1}{2}$" Strips. The 1" loose Pulleys support the centre part of the track, and they are spaced apart by Washers. The short lengths of wire and the Driving Bands provide a good grip, and a model fitted with similar creeper tracks to these should be able to climb fairly steep inclines.

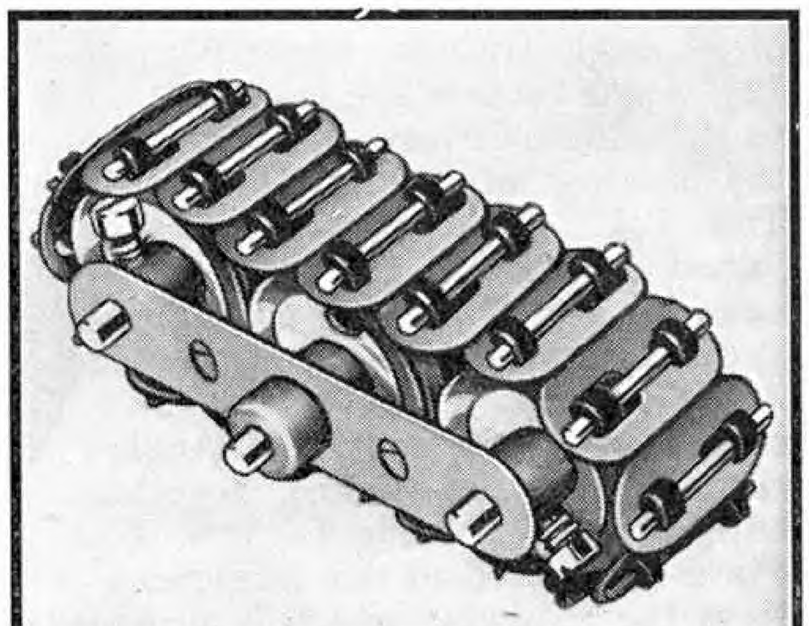


Fig. 379

(378) Front Axle Mounting (S. Sherman, Coventry)

Model-builders often have difficulty in making an effective front axle mounting for model carts or wagons. The one shown in Fig. 378, was devised by S. Sherman of Coventry, and constitutes a neat method of overcoming the difficulty. The front axle, which is a $5\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strip has a Flat Trunnion 1 bolted to it by two $\frac{1}{2}$" Bolts. A second Nut is placed on each Bolt, and a Bush Wheel added. Further Nuts lock the Bush Wheel in place. Four Bolts, fitted with two Nuts each, are fastened at intervals round the circumference of the Bush Wheel, and a 2" Rod 2 is inserted in its boss and secured there.

A Wheel Flange 3 is placed on the Bush Wheel so that the slightly projecting ends of the four Bolts fit in the four holes in the Wheel Flange. In a similar manner a second Bush Wheel 4 is bolted to a $3\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strip, that is to be attached to the wagon, by two $\frac{1}{2}$" Bolts and lock-nuts, taking care that only about one thirty-second of an inch of the Bolt protrudes beyond the lock-nut. Two Bolts 5 fitted with Nuts are fitted to the Bush Wheel and further Nuts added. As before a Wheel Flange is added, and the complete assembly is pushed on to the 2" Rod 2. A Collar holds them together.

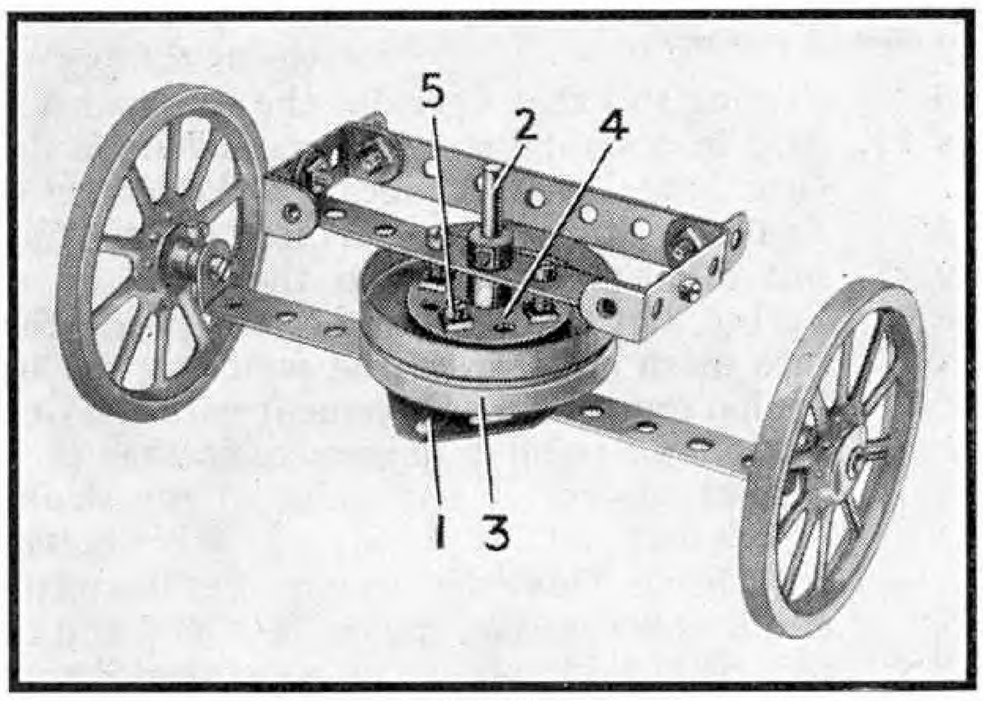


Fig. 378

The smooth turning of this mechanism depends on the adjustment of the various Bolts on the Bush Wheels, and it is necessary to see that they have the correct amount of clearance before assembling the parts.

Meccano Oil applied between the wheel flanges will eliminate friction, and also will enable the parts to be clamped closely together. In addition the application of lubricant will prevent wobble in the axle.

Miscellaneous Suggestions

Under this heading "Spanner" replies to readers who submit interesting suggestions regarding new Meccano models or movements that he is unable to deal with more fully elsewhere. On occasion he offers comments and technical criticisms that, he trusts, will be accepted in the same spirit of mutual help in which they are advanced.

M.193. R. Nelson, Northampton, recently constructed a model in which he required to transmit the drive from one shaft to another working at an angle of 135° to the first shaft, but did not have any Universal Coupling to use for this purpose. He made the interesting discovery, however, that the smallest of the Meccano Helical Gears (Part No. 211a) when meshed with a $\frac{1}{2}$" Pinion gave the required angle. The arrangement gives a ratio of approximately 1.4 : 1 and can be reversed.

M.194. Many model-builders who are also budding artists will find a paint lining device submitted by S. Todd, of Windermere, a useful accessory. The device consists of a Coupling that has a Rod pushed through its centre hole. On each side Bush Wheels are fastened so that there is no side-play in the Rod. The paint brush is pushed through the top plain hole in the Coupling and wedged there. In this way fairly straight lines can be drawn with a paint brush, and if desired, a gauge can be fixed to the side so that lines can be drawn parallel to the edge of the board on which the paper is fixed.

Prize-Winning Working Models

Ingenious Ideas of "M.M." Readers

IN this article we describe five models selected from the thousands of excellent efforts submitted by readers of the "*M.M.*" in Model-building Contests. Each of these models is original in type, and contains features that make it of interest to other model-builders on the look out for original ideas. All are working models that are easy to build and remarkably realistic in their movements.

The first model to be dealt with is the fine beam lifting bridge shown in Fig. 1. Bridges of this type are not often seen in England, although they are used to a great extent in Europe for bridging canals. The model was built by J. H. Beecroft, Nottingham, and is a particularly good example of bridge construction.

The main framework consists of 3" Angle Girders supporting 12½" Angle Girders and is bolted to 18½" Angle Girders, that form the base for an Electric Motor. The 12½" Angle Girders are joined together at their upper ends by a 12½" Braced Girder and are clamped between further Angle Girders. The sides of the bridge are made with 18½" Angle Girders and are linked together with five 12½" Angle Girders. Flat Plates are bolted to this framework to form the roadway, which is provided with pavements 2½" wide on each side.

The bridge is hinged to the base at its lower end. Two 11½" Rods are pivoted on 2" Rods journalled in the framework of the bridge, and these connect the bridge with the beam, which is pivoted on a 11½" Rod journalled in the Strips that connect the top ends of the vertical framework.

The beam consists of two 24½" Angle Girders connected together at their ends and centres by four 12½" Angle Girders. In the middle of the beam so formed four 3½" Angle Girders are bolted two and a half inches apart, and to these are attached two 12½" Braced Girders. To the tops of the 3½" Angle Girders 12½" Strips are connected, the other ends of the Strips being bolted to the ends of the 24½" Angle Girders to form tension bars. The weight of the lifting span is counter-balanced by weights carried in a box constructed from 5½" × 2½" Flat Plates and 12½" Flat Girders and mounted on the rear end of the beam.

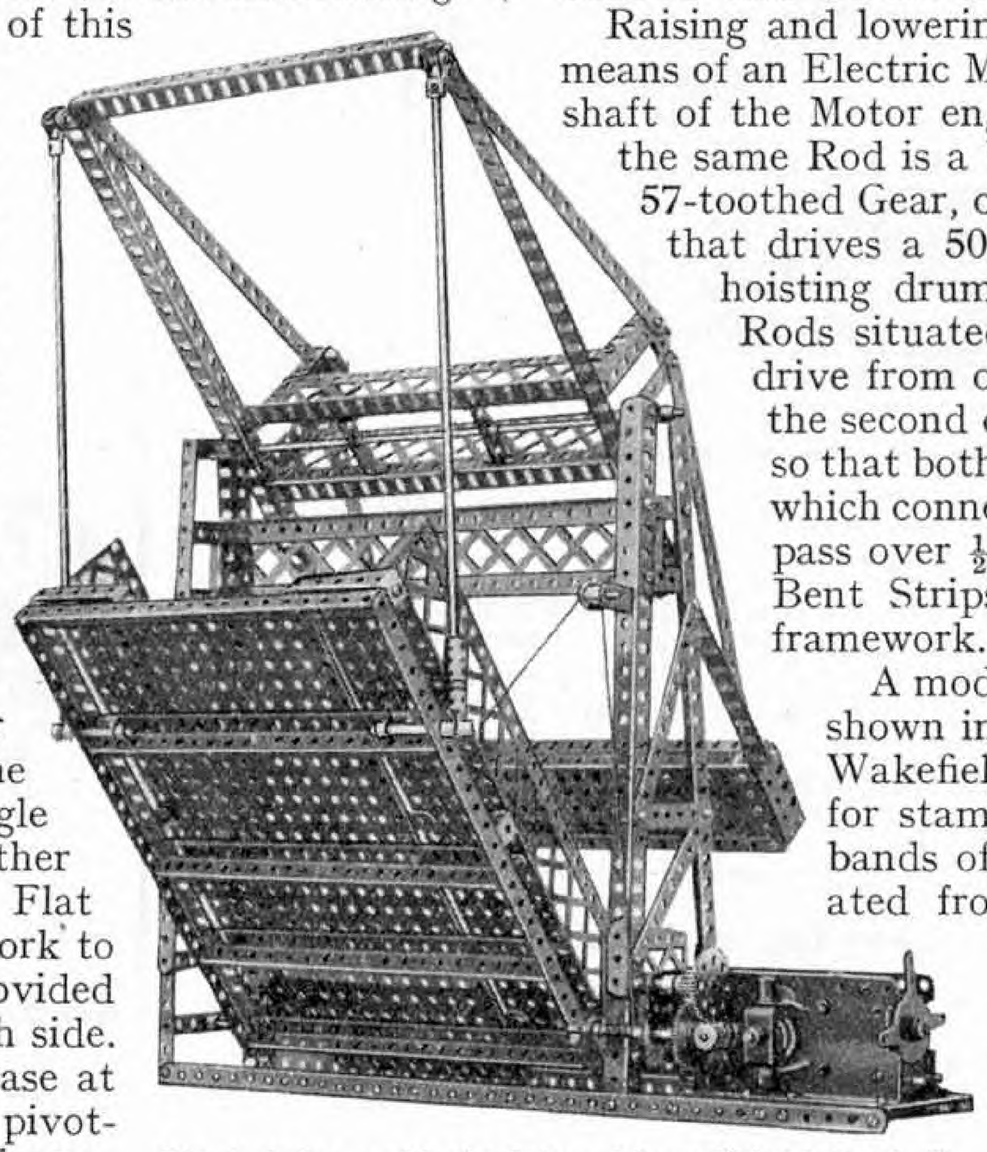


Fig. 1. A fine model of a balanced beam lifting bridge built by J. H. Beecroft, Nottingham.

Raising and lowering of the bridge is carried out by means of an Electric Motor. A ½" Pinion on the armature shaft of the Motor engages with a 57-toothed Gear. On the same Rod is a Worm that engages with a second 57-toothed Gear, on the shaft of which is a ½" Pinion that drives a 50-toothed Gear on the Rod of the hoisting drums. The drums consist of two 1½" Rods situated on each side of the model. The drive from one of the drums is transmitted to the second drum by means of Sprocket Chain, so that both drums rotate together. The Cords, which connect the bridge to the hoisting drums, pass over ½" loose Pulleys carried in Cranked Bent Strips placed midway up the vertical framework.

A model of a roller feed stamping press is shown in Fig. 4. It was made by D. Hirst, Wakefield, and represents a machine used for stamping small parts from continuous bands of metal. The punching die is operated from a built-up crankshaft formed from two short Rods, to each of which is secured a Coupling. These are fastened tightly in place by a Screwed Rod that forms the crank pin, and which carries a further Coupling that serves as the big end for the connecting rod that operates the die, which is a short Rod held in a Coupling. The crankshaft is driven by a 3½" Gear Wheel that engages a ½" Pinion on the Rod of the flywheel. Normally, as this Rod rotates the Pinion is held out of engagement with the Gear by a Compression Spring, but on depressing a foot pedal, the Pinion slides into mesh and causes the punching die to operate. The Pinion remains in engagement with the Gear only so long as the foot-pedal is depressed, so that the press is under perfect control at any point of the stroke.

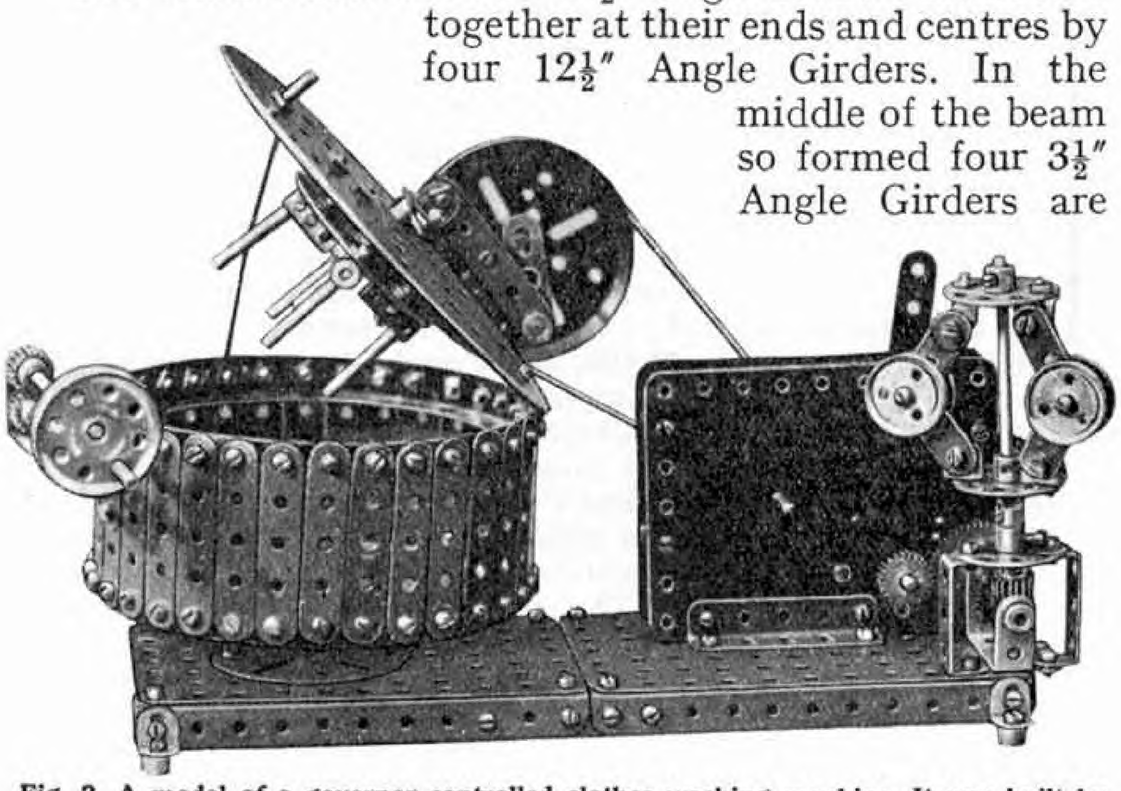


Fig. 2. A model of a governor-controlled clothes washing machine. It was built by M. Lyzet, Gauderan, France.

The foot pedal is an Angle Bracket bolted to one end of a 3½" Strip. This Strip is pivoted at its centre, and its other end is connected by means of a Rod and Strip Couplings to a Bell Crank, pivoted in a Cranked Bent Strip attached to the upper part of the model. A Rod connected to the other arm of the Bell Crank passes through the side plates of the model, and a selector fork consisting of two 1" Rods held in a Coupling, is fixed to its end. This fork fits in the narrow part of a Socket Coupling, which holds the ½" Pinion in a similar way to the withdrawal mechanism of a friction clutch. In this way the ½" Pinion is moved into mesh with the 3½" Gear when the foot pedal is depressed.

The drive is taken from the crankshaft to the feed mechanism by Bevel and spur gearing, the final stage being through Sprockets and Chain to a drum formed from two $1\frac{1}{8}$" Flanged Wheels butted together. A Strip of paper that represents the metal to be punched passes over the drum and is gripped by a $\frac{3}{4}$" Pinion mounted on a short Rod carried in the end transverse bore of a Coupling. A Spring keeps the Pinion continually pressing on the paper.

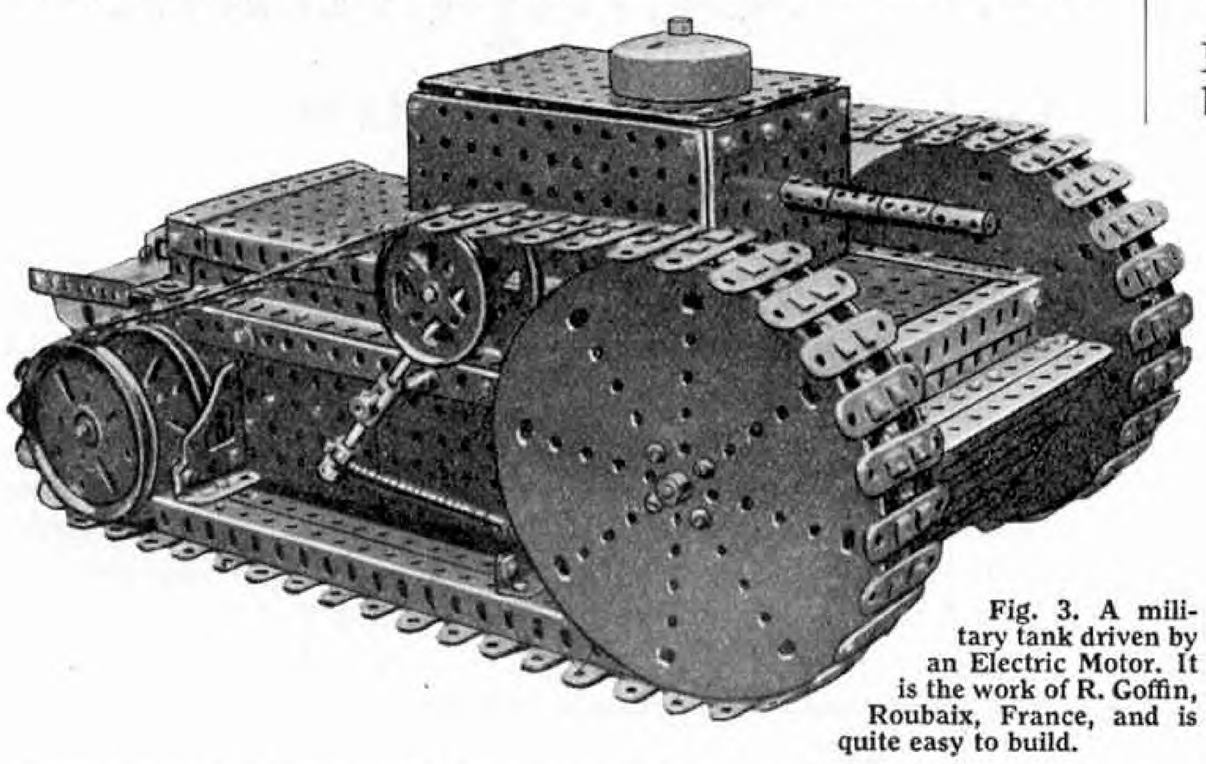


Fig. 3. A military tank driven by an Electric Motor. It is the work of R. Goffin, Roubaix, France, and is quite easy to build.

The accuracy with which the model operates depends to a large extent on the rigidity of its construction, and on the accurate fit of the sliding ram that holds the stamping die.

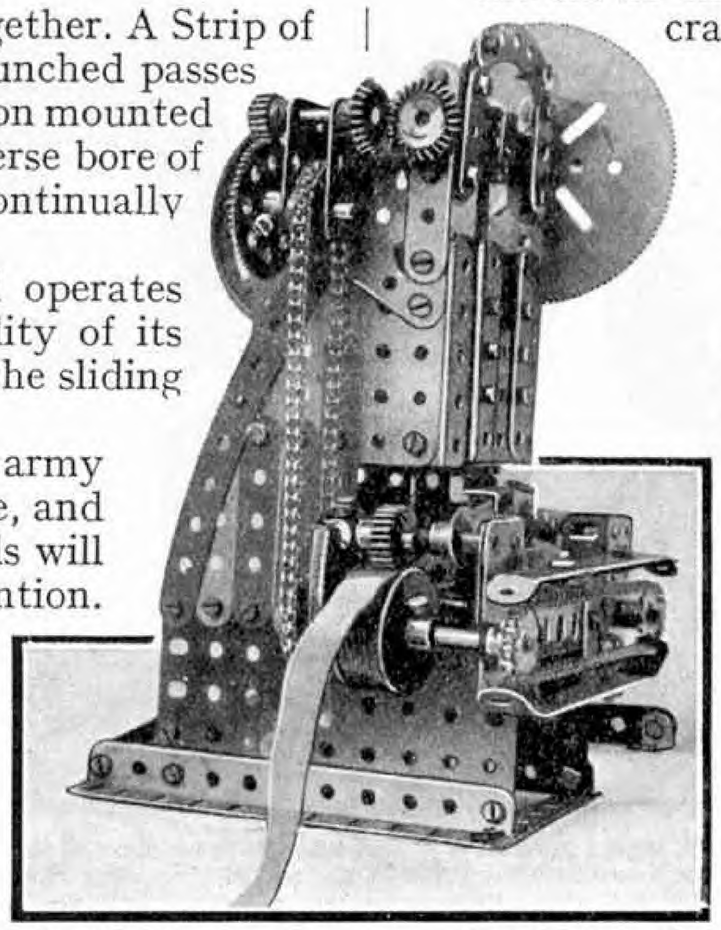


Fig. 4. This stamping press, which is fitted with automatic feed, was built by D. Hirst, Wakefield.

Fig. 3 shows a model of a French army tank built by R. Goffin, Roubaix, France, and readers who like to build working models will find it an excellent subject for their attention. It is driven by an Electric Motor mounted on a framework of Angle Girders inside the body. This framework accommodates also all the controls and forms the skeleton for the outer casing. A train of gears transmits the drive from the Motor to a differential gear, each side of which drives two pairs of 3" Pulleys on the outside of the tank casing. The purpose of the differential gear is to enable each of the creeper tracks to be driven independently of the other. The movement of each track is controlled by an internal expanding brake, and the tank is steered by varying the speeds of the two creeper tracks.

The construction and method of mounting the creeper tracks are interesting on account of the original ideas incorporated. Each track consists of a length of Sprocket Chain to which a number of 2" Strips are clamped by means of Flat Brackets and Bolts. The track passes round 6" Circular Plates mounted on a Rod journalled in the casing at the front of the tank and round the pairs of 3" Pulleys at the rear. Two $9\frac{1}{2}$" Girders are bolted to $1\frac{1}{2}$" Angle Girders to form a channel section girder and this is then bolted on the side of the tank by means of Flanged Brackets. The purpose of the channel section girders is to keep the track in contact with the ground.

The track is maintained in tension by a jockey pulley, which consists of two 2" Pulleys mounted on a 2" Rod that is held in the prongs of a Fork Piece secured on a second Rod that has a Coupling fastened on its end. This Coupling is mounted on a Rod that is passed through the side of the tank and is held in position by a Collar placed on its end inside the tank. A Spring hooked on to a second Rod journalled in the Coupling, is bolted at its other end to the side of the tank. As a result of the pull of the Spring the jockey pulleys are forced against the creeper track and maintain it in correct tension.

The gun barbette is built up from two $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flat Plates and two $3\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plates, these being bolted together by means of the flanges of the smaller Plates. The roof, a $5\frac{1}{2}" \times 3\frac{1}{2}"$ Flat Plate, rests on $\frac{1}{2}" \times \frac{1}{2}"$ Angle Brackets fastened on the inside of the barbette, and it is fitted on top with a Boiler End that represents a revolving look-out post.

Many ingenious machines have been introduced in recent years for the purpose of washing clothes quickly and with the minimum amount of labour. One of the most commonly used forms of these machines is reproduced in the simple, but neatly designed model shown in Fig. 2. This model was built by M. Lyzet, Gauderan, France.

In machines of this kind the clothes to be washed are placed in the tank, which is then partly filled with boiling water. An arrangement of vertical pegs fixed to the lid of the tank are then oscillated rapidly by a crank arrangement driven at a constant speed by machinery. In this way the clothes are whirled through the water and are thoroughly washed in a much shorter time than would be possible by hand.

The model consists essentially of a circular tank constructed from Circular Girders, round the outside of which $2\frac{1}{2}$" Strips are bolted. The complete tank is secured by two Face Plates to a base that consists of two $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flat Plates fastened together by $5\frac{1}{2}"$ Angle Girders and Strips. Inside the tank a set of agitators or pegs are arranged to oscillate backward and forward, being driven by a governor-controlled Clockwork Motor.

The pegs consist of short Rods mounted on a Face Plate by means of Couplings, as shown in the illustration. A $\frac{1}{2}$" Pulley on the Motor driving shaft is connected by a belt with a 3" Pulley on a Rod journalled in a Double Bent Strip bolted to the Circular plate that forms the cover for the washing tank. This Rod carries at the end opposite to the 3" Pulley a Double Arm Crank, to one arm of which a $2\frac{1}{2}$" Strip is pivotally attached. The other end of the Strip is pivotally bolted to an Angle Bracket secured to the centre spindle of the agitator pegs.

Fig. 5 shows a model drawbridge of the kind used at the entrances to Norman castles. It is quite easy to build and was submitted by A. Chew, Wilmslow.

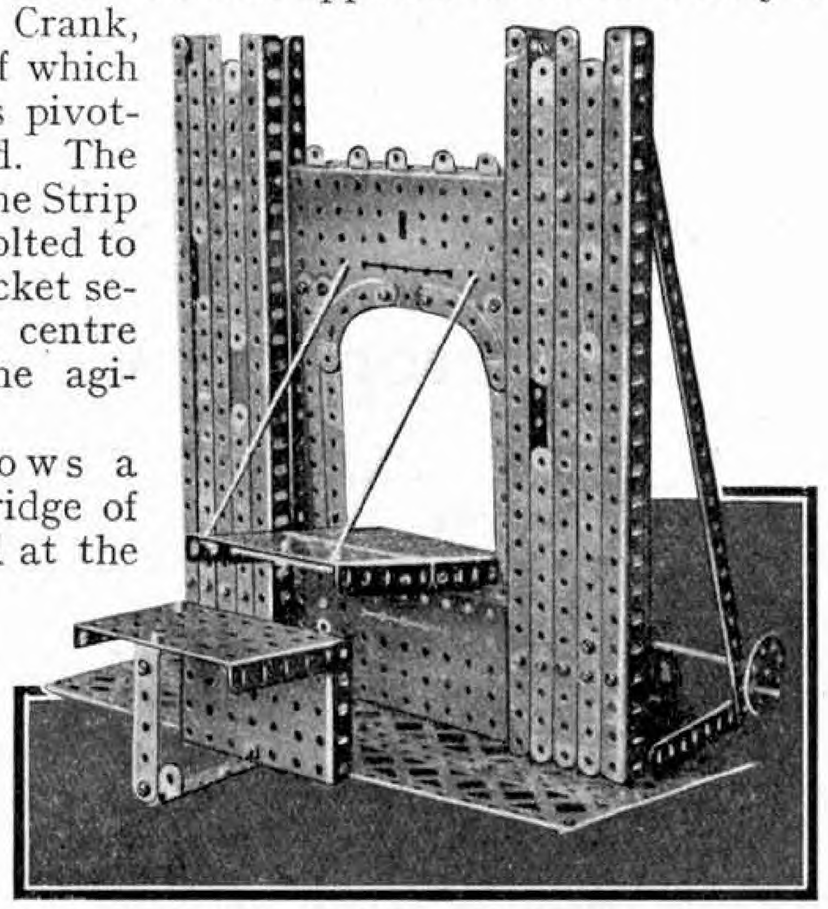
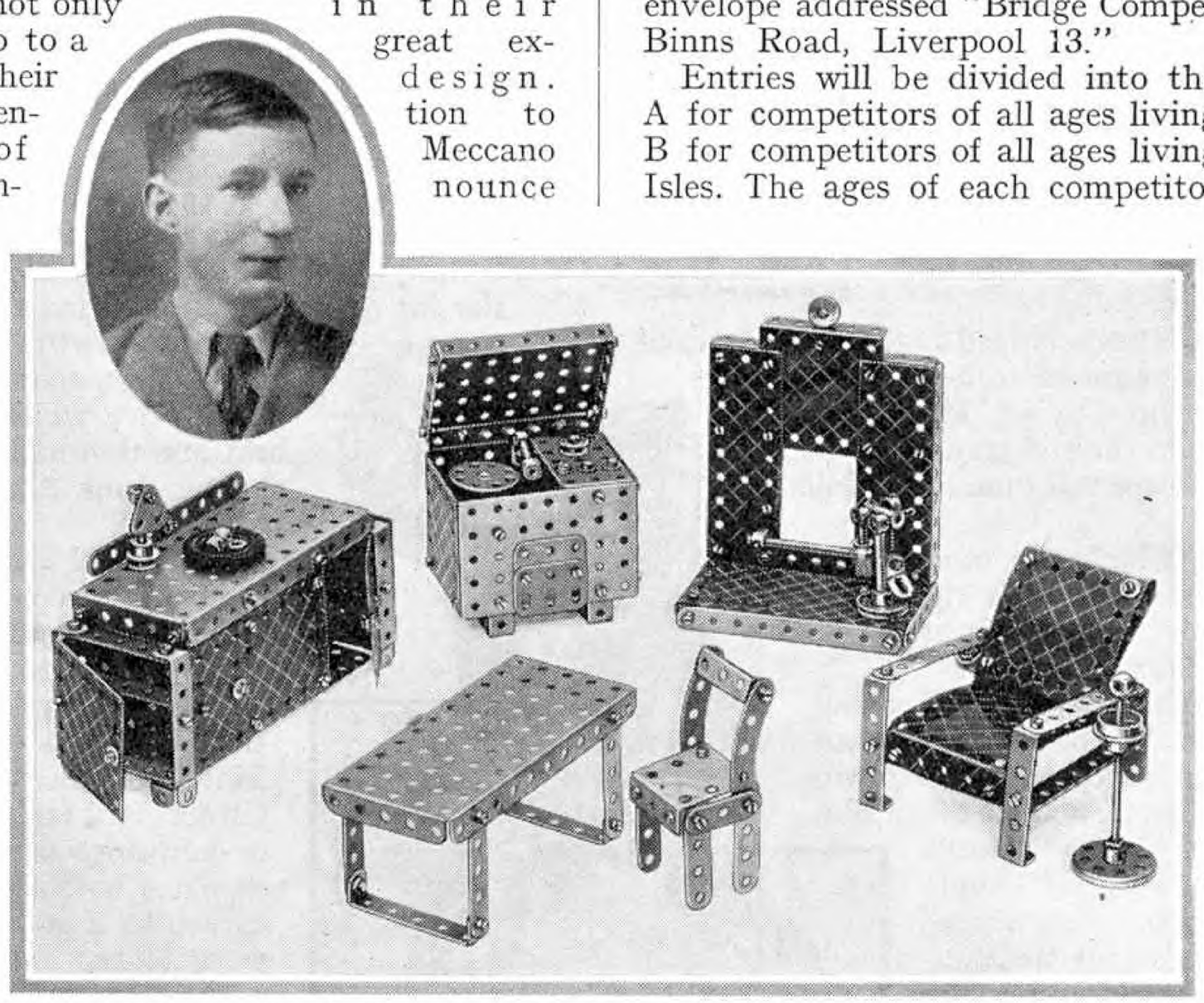


Fig. 5. A simple drawbridge suitable for incorporating in a model of a castle. It is the work of A. Chew, Wilmslow.

Meccano Model-Building Competitions

"Bridge" and "Aeroplane Constructor" Contests

Bridges provide some of the most wonderful and beautiful examples of modern engineering construction, and at the same time are particularly suitable for reproduction in Meccano, not only in their general plan, but also to a great extent in the details of their design. In order to draw attention to the possibilities of Meccano in this direction, we announce this month a "Bridge-building" competition, in which prizes are offered for the best models of this kind built by readers of the *"M.M."*



A. Spring of Cainscross, Stroud, whose portrait is shown inset, is the builder of this group of realistic furniture. These splendid models were awarded First Prize in our recent "Familiar Home Objects" Competition.

Competitors may choose any type of bridge they like as the subject for their models. They may reproduce as far as possible a bridge that they have seen, or that is known to them through photographs or illustrations in the *"M.M.,"* or elsewhere, or they may create a design of their own. The range of choice is extremely wide, and includes cantilever, arch, suspension, rolling, swing and lifting bridges. Any size of Outfit may be used, but it is not necessary to build a large and elaborate structure such as the Sydney Harbour Bridge in order to win a prize. Models of the smaller types of bridges, such as railway footbridges or arch bridges over canals will receive just as much consideration from the judges, provided they are neatly and sturdily built, and follow sound mechanical principles in design.

Competitors must send in either photographs or drawings of their models, together with any explanatory notes that may be necessary. Actual models must not be sent. Each competitor must write his age, name and address on the back of his entry, and enclose it in an envelope addressed "Bridge Competition, Meccano Ltd., Binns Road, Liverpool 13."

Entries will be divided into the following Sections. A for competitors of all ages living in the British Isles; B for competitors of all ages living outside the British Isles. The ages of each competitor will be taken into consideration when judging the entries and deciding the prize-winners.

Prizes will be awarded for the best entries from each Section as follows: First, Meccano or Hornby products value £3/3/–; Second, products value £2/2/–; Third, products value £1/1/–. In addition there will be 10 consolation awards of products value 5/–. Successful competitors will be allowed to select any products they like to the value of their prizes from current Meccano and Hornby Train price-lists.

The closing date for Section A will be 31st May, 1937, but Section B will remain open for entries until 31st July, in order to give Overseas readers ample opportunity to prepare and post their entries.

It should be noted that photographs or drawings of prize-winning models become the property of Meccano Ltd. Unsuccessful entries, however, will be returned to competitors provided that a stamped and addressed envelope of suitable size is enclosed with the entry for that purpose.

"Aeroplane Constructor" Model-Building Contest

This competition is arranged for the benefit of owners of Meccano Aeroplane Constructor Outfits. Competitors may choose any type of aeroplane, including flying boats and seaplanes for their subjects, but models must be built from Meccano Aeroplane Constructor parts. Standard Meccano parts also may be used, but the principal portions of the models submitted must be made with the Aeroplane parts.

The competition is open to readers of all ages, living in any part of the world, and there will be only one section, but the ages of competitors will be taken into consideration when judging the models. The prizes to be awarded for the best models entered in this contest are indicated in the accompanying panel.

It is only necessary to submit either a photograph or a drawing of the model, together with a few details of its construction. The competitor's age, name and address must be written on the back of every photograph or drawing sent in. Entries must be addressed "Aeroplane Constructor Contest, Meccano Ltd., Binns Road, Liverpool 13," and must reach this office before 31st July, 1937.

Since the first Aeroplane Constructor Outfits were introduced, several new parts have been added. Competitors who wish to bring their Outfits up to date should ask their dealer for our latest price lists.

"Meccano Aeroplane Constructor" Competition

The Prizes

First: Meccano or Hornby products value £2/2/–.
Second: Meccano or Hornby products value £1/1/–.
Third: Meccano or Hornby products value 10/6.
Five prizes each of products value 7/6.
Five prizes each of products value 5/–.
A number of Certificates of Merit also will be awarded.

Model-Building Competition Results

By "Spanner"

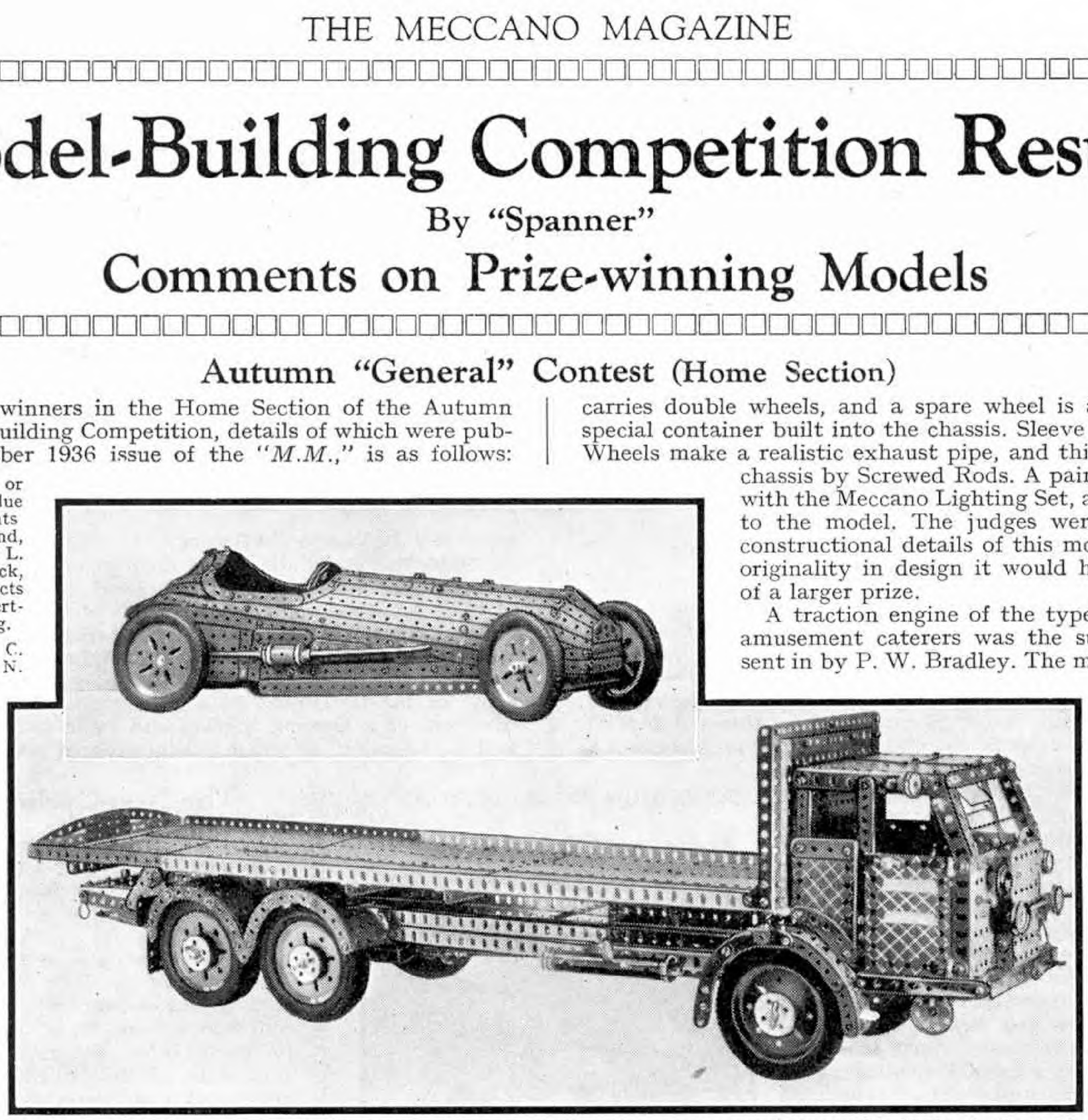
Comments on Prize-winning Models

Autumn "General" Contest (Home Section)

The list of prizewinners in the Home Section of the Autumn "General" Model-Building Competition, details of which were published in the October 1936 issue of the *"M.M.,"* is as follows:

1st Prize, Meccano or Hornby products value £3/3/–: E. Clements Farnborough, Kent. 2nd, products value £2/2/–: L. McKenzie, Prestwick, Ayrshire. 3rd, products value £1/1/–: A. Robertson-Aikman, Worthing.

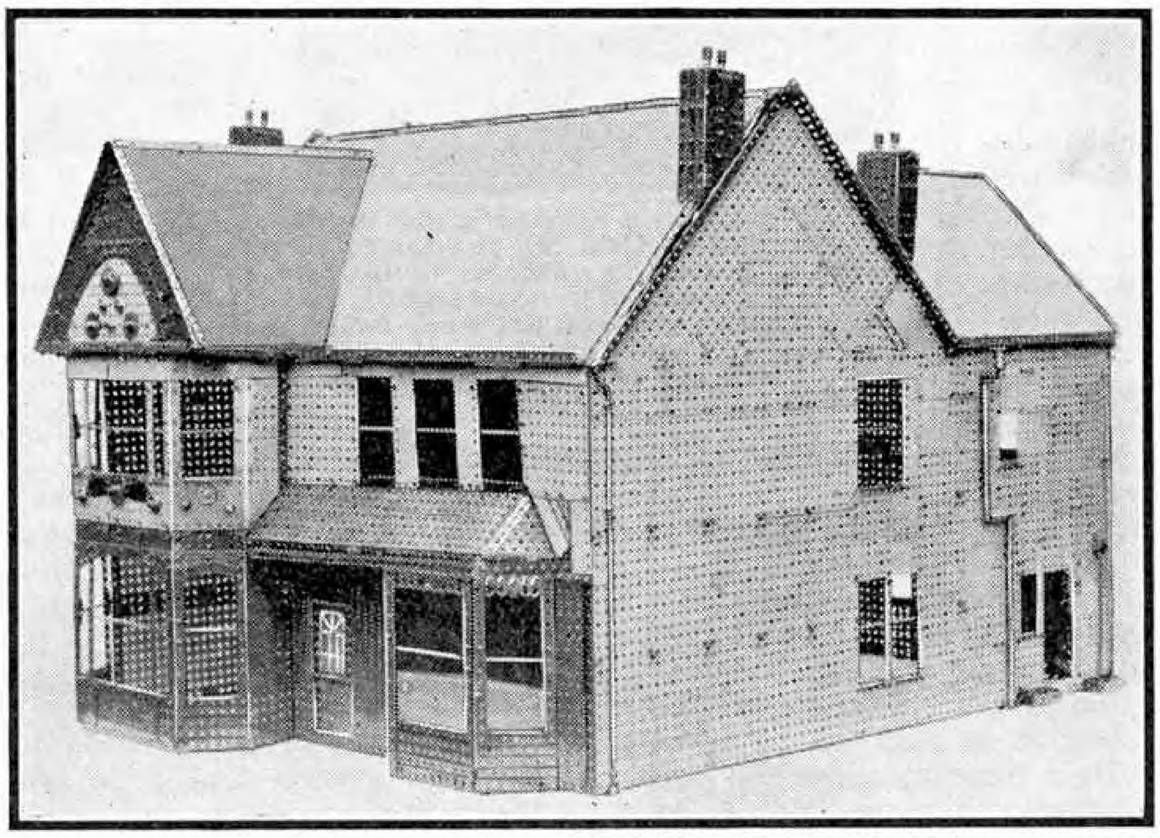
Products value 5/–: C. Gregory, Nottingham; N. Sharples, Edinburgh; P. Frost, Nottingham; H. Williams, Birmingham; P. Bradley, Stanmore, Middx.; G. Harrison, Betchworth, Surrey; A. Mills, Bilston By Roslin, Midlothian; J. Kennett, Richmond; S. Robinson, West Hartlepool; W. Phillips, Fulstow, Lincs.; A. Watkins, Brecon; H. Waters, Liverpool.



Two fine models that won prizes in the Autumn "General" Contest. The racing car is the work of L. McKenzie, Prestwick, Ayrshire, and the six-wheeled lorry was built by A. Robertson-Aikman, Worthing.

The competition was open for models of any kind built from Meccano parts. There were no restrictions as to the size of Outfit to be used, and as a result competitors had ample scope to reveal their ingenuity and skill. A large number of interesting models was submitted and I am describing a few of the most outstanding and original for the benefit of readers on the look-out for interesting subjects for future attention.

A model house submitted by E. D. Clements was awarded First Prize. The house is constructed mainly of Strips and Flexible Plates attached to a framework of Angle Girders, and is remarkable for the amount of detail that it contains. The downcomer drainage pipes are represented by Axle Rods, and are held in place by Handrail Supports. Worm Gears are used to represent chimney pots, and they look most realistic on the built-up stacks. The front of the house is decorated in a neat design, wheels of different sizes and types being used with good effect for this purpose. The front door, which is constructed of 2½" Strips and Simple Bell Cranks, is fitted with a pane of leaded glass, and is mounted on hinges so that it can be opened and closed. A sheet of cardboard serves as the roof, and is held in place by Strips and Angle Girders.



A close examination is necessary to reveal that this well-proportioned house is not an actual modern villa, but only a Meccano miniature. It was built by E. D. Clements, Farnborough, and won First Prize in the "General" Model-Building Competition.

L. McKenzie sent the neat model motor racing car illustrated on this page. It was awarded Second Prize, the judges being very favourably impressed with its sturdy construction, good proportions and realistic appearance.

A. Robertson-Aikman submitted a model of a six-wheeled lorry, which is equipped with a three-speed and reverse gear-box, differential and Ackerman type steering. Each of the two rear axles carries double wheels, and a spare wheel is accommodated in a special container built into the chassis. Sleeve Pieces and Flanged Wheels make a realistic exhaust pipe, and this is attached to the chassis by Screwed Rods. A pair of headlights made with the Meccano Lighting Set, add a finishing touch to the model. The judges were pleased with the constructional details of this model, and with more originality in design it would have been deserving of a larger prize.

A traction engine of the type used by travelling amusement caterers was the subject of the entry sent in by P. W. Bradley. The model is driven by an Electric Motor, and is fitted with a gear-box so arranged that the power can be used to drive either the traction engine or a dummy dynamo that is mounted at the forward end of the cab. Two terminals placed near the dynamo are wired in parallel with the Motor, so that model roundabouts may be driven. This is an interesting touch of realism and is very effective. The cab carries all the fittings usually found in a traction engine, and the firebox is provided with a hinged door.

H. Williams submitted a layout for a two-way Dinky Toys car drive. In this Dinky Toys motor vehicles are pulled along by means of pieces of wire that protrude through slots in a sheet of plywood fitted with buildings and roadways to represent a village.

Christmas "Simplicity" Model-Building Contest (Home Section)

The following competitors were successful in winning prizes in the "Simplicity" Competition announced in the *"M.M."* for December 1936.

1st Prize, Meccano or Hornby products value £2/2/–: D. Linfoot, York. 2nd, products value £1/1/–: A. Miller, Liverpool 14. 3rd, products value 10/6: E. Winters, Brighton.

Products value 5/–: A. Tarry, Harpenden; H. Chatterton, Croydon; J. Speed, Gresty, Nr. Crewe; E. Field, Coventry; J. Jones, Manchester 14; J. Marshall, Nottingham.

"Nuts and Bolts" Estimating Contest (Home and Overseas)

In this Contest competitors were invited to estimate the number of nuts and bolts used in building the model B.S.A. three-wheel car illustrated on page 596 of the *"M.M."* for October 1936. The competitors named in the following list submitted estimates most nearly correct and accordingly they have been awarded prizes as indicated, in order of merit.

1st Prize, Meccano or Hornby products value £2/2/–: R. Waters, Bexley Heath, Kent. 2nd, products value £1/1/–: Loh Meng Chew, Singapore, Straits Settlements. 3rd (tie), products value 10/6 divided equally between R. Emdon, Plymouth and F. Smith, Leamington Spa.



Drawing Up the Summer Programme

April marks the beginning of the first of the two Summer Sessions, and with the return of the light evenings when Summer time is resumed on the 18th of the month, the indoor activities that have been the life of clubs during the winter months will begin to take second place.

No hard-and-fast rules can be laid down in regard to the type of outdoor programme that should be drawn up, as this will depend upon the size and resources of the club, and upon its situation. A club in the centre of a large city or town will not have the same opportunities as one in the country, or, at any rate, will not have facilities for outdoor pursuits so readily at hand. The first step in every case therefore is to make a review of the possible summer work.

Cricket probably will be the first thought and this ideal outdoor activity is readily available even to clubs in large cities and industrial areas, thanks to the increasing provision of public recreation grounds in various parts of cities and towns. A good cricket programme demands very early preparation, as nothing is more disheartening to a club than to find it cannot obtain even a moderately full list of fixtures, owing to application having been left until the season has actually begun. Now is the time, therefore, to make enquiries about a ground and to approach other clubs in the district with a view to arranging friendly return games.

Organising a Cycling Section

During the past few years interest in cycling has greatly increased. In many clubs Cycling Sections were organised last year, and no doubt they will be revived this spring. I hope that the idea will be taken up by other clubs in which a sufficient number of members possess bicycles to make the venture worth while. The attractiveness of the club cycling run is to be found in the spirit of comradeship that prevails among the members, for punctures and other small mishaps that are liable to occur do not overshadow the pleasures of the sport. Instead they provide opportunities for the practical expression of the Meccano spirit. The ready co-operation of the members of the party make light work of any repairs that may be necessary, and little troubles are forgotten in the general enjoyment.

If there is sufficient support in the club for the formation of a definite cycling group, the Leader would do well to appoint a senior member to take charge of it, and another might also be chosen to act as secretary to the group. A suitable programme can easily be arranged with the help of a small committee, and the payment of a trifling subscription will soon raise a fund to cover the cost of maps, guide books and any other articles that are likely to be useful to the group as a whole. Any surplus after these important purchases have been made should be put to the credit of a repair fund.

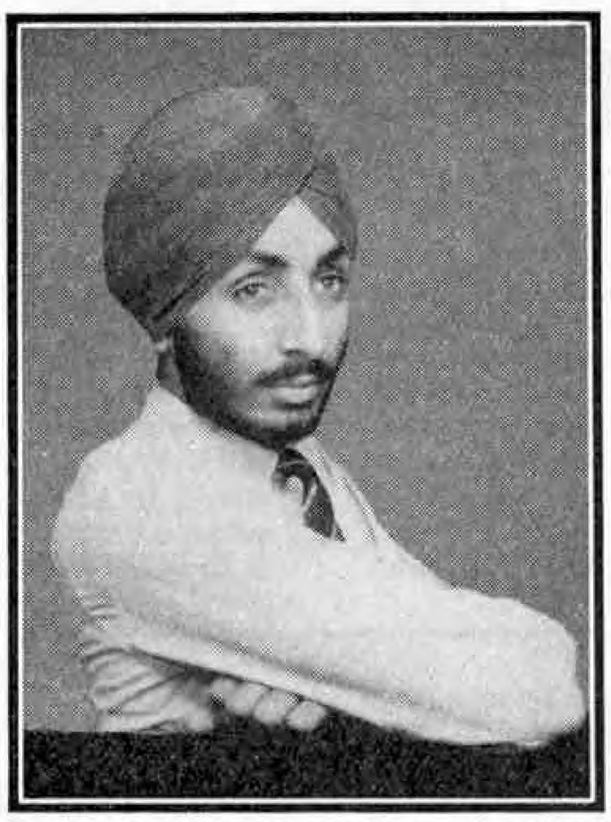
Catering for Juniors and Seniors

In some clubs it has been found advisable to form separate Cycling Sections for seniors and juniors. One advantage of this arrangement is that fairly long runs can be arranged for the older members, and shorter runs for those whose outings should be restricted in length. Joint outings of course can be planned in which the juniors can take a short cut and meet the seniors at some point on the homeward part of the run.

Any cycle run in congenial company is enjoyable, but the pleasure of an outing is greatly increased if it is planned with some objective in view. For instance, a visit can be made to some interesting place or holiday resort at a convenient distance. Similarly the members of a Cycling Section can cycle to a place selected for a club excursion, to which others proceed either by train or bus.

Meccano Club Secretaries

No. 39. Mr. S. Harbhajan



Mr. S. Harbhajan is secretary of the Ranjit (Lahore) Meccano Club. This club has grown considerably since its affiliation in October 1931, and the chief of its many activities are Model-Building, Fretwork and Stamp Collecting. Members recently completed an extensive trip by road and rail over a total distance of 430 miles.

The Non-Cycling Members

It is unlikely that every member of a club will be a cyclist and in some instances there may be very few cyclists among the members. It is then necessary to fall back upon rambles to provide for the walkers. A ramble need not be a mere walk, in fact it should not be. It is much better to make it a means to an end, and to have as its outcome a visit to some place of interest, or some other diversion, as suggested in regard to cycling runs. When rambles are combined with cycle runs, those who walk can make use of footpaths, the cycling minority following a more circuitous route, carrying with them the necessary refreshments and any material required for playing games.

Opportunities for Recruiting

The Exhibitions and Open Nights held periodically during the Winter Sessions provide an opportunity for outsiders to become acquainted with the activities of the club, and with those comprising its membership. Similar opportunities can be provided during the summer by inviting relatives and friends of members to take part in outdoor events. A picnic or a visit to some popular beauty spot or other place of exceptional interest is an excellent way of enabling non-members to become acquainted with the club. This applies to both rambles and cycling excursions, and is a very good way of attracting new Meccano enthusiasts to the club. Members recruited during the summer have good opportunities to become fully acquainted with the other members by the time regular indoor meetings are resumed.

Proposed Clubs

Attempts are being made to establish Meccano Clubs in the following places, and boys interested should communicate with the promoters whose names and addresses are given below:

CEYLON—T. V. Amagh, St. John's College, Panadura.
INDIA—M. F. Din, Mobd Sadig Ali, Lohari Mandi, Lahore.
LONDON—I. Morgan, 10, Stewart Close, Kingsbury, N.W.9.
MANCHESTER—A. Jackson, 38, Kershaw Street, Droylsden.
SALISBURY—G. Newman, 22, East Street, Salisbury, Wilts.
SOUTH AFRICA—Mr. M. Vercuiel, Park Street, Porterville, Cape Province.
SUTTON COLDFIELD—C. H. Angell, 30, Ivory Road, Sutton Coldfield.
TOLWORTH—P. M. Mullis, 83, Elmdene, Tolworth.



Great Baddow (Chelmsford) M.C.—On one Model-building Evening "*Road Traffic Models*" were constructed. Several of the senior members acted as instructors, and driving tests were held with the models built. A road was marked out in chalk on the floor, and included crossings, islands, etc. Some of the members acted as pedestrians. The Leader gave an interesting Lecture on the four-cycle engine. He afterwards invited the members to write an essay on the subject, and one of the honorary members offered a set of books as a prize. Club roll: 38. *Secretary:* K. Avis, 5, Crescent Road, Great Baddow.

Hornsea M.C.—Lectures on "*Peoples of Modern Europe*," "*Chemistry*," "*Photography*," and "*Wireless*" have been given. At one meeting the Leader gave a Nature talk that was much enjoyed. Several meetings have been devoted to Hornby Railway operations. Games, Film Shows, and Social Evenings have formed the lighter side of the programme. Club roll: 15. *Secretary*: P. Thom, 5, Alexandra Road, Hornsea.

St. James' (Grimsby) M.C.—All members are keen, enthusiastic model-builders, and many enjoyable evenings have been devoted to this hobby. The Naval Exhibition at the school was very successful. A fine model of a "Baltic" tank locomotive has been built, and its display at the school benefited club funds by 4/6. The club were invited by the Grimsby Model Engineering Society to send a model to the Society's Exhibition, and a Meccano Grandfather Clock was built for the purpose. A photograph of the clock was reproduced in a local newspaper. Club roll: 7. *Secretary:* A. N. Dixon, 65, Yarborough Road, Grimsby.

Old Charlton M.C.—Excellent models brought by members to a recent meeting included a particularly striking one of a crane that automatically opened and closed its grab and revolved while the load was being raised or lowered. The committee recommended the model for display at the forthcoming club Exhibition. A Debate has been held on "*Should Motor Cycles be Prohibited?*" After good speeches both for and against, the discussion ended in a vote for the retention of motor cycles. Investigations by two "detectives" into a "crime" committed by a member, resulted in a Mock Trial that proved very enjoyable. The prisoner was found guilty by the jury, but the Judge, the club President, rejected the verdict on the grounds of insufficient evidence, and discharged the prisoner. Club roll: 20. *Secretary:* W. Bailey, 63, Rectory Grove, Woolwich, S.E.18.

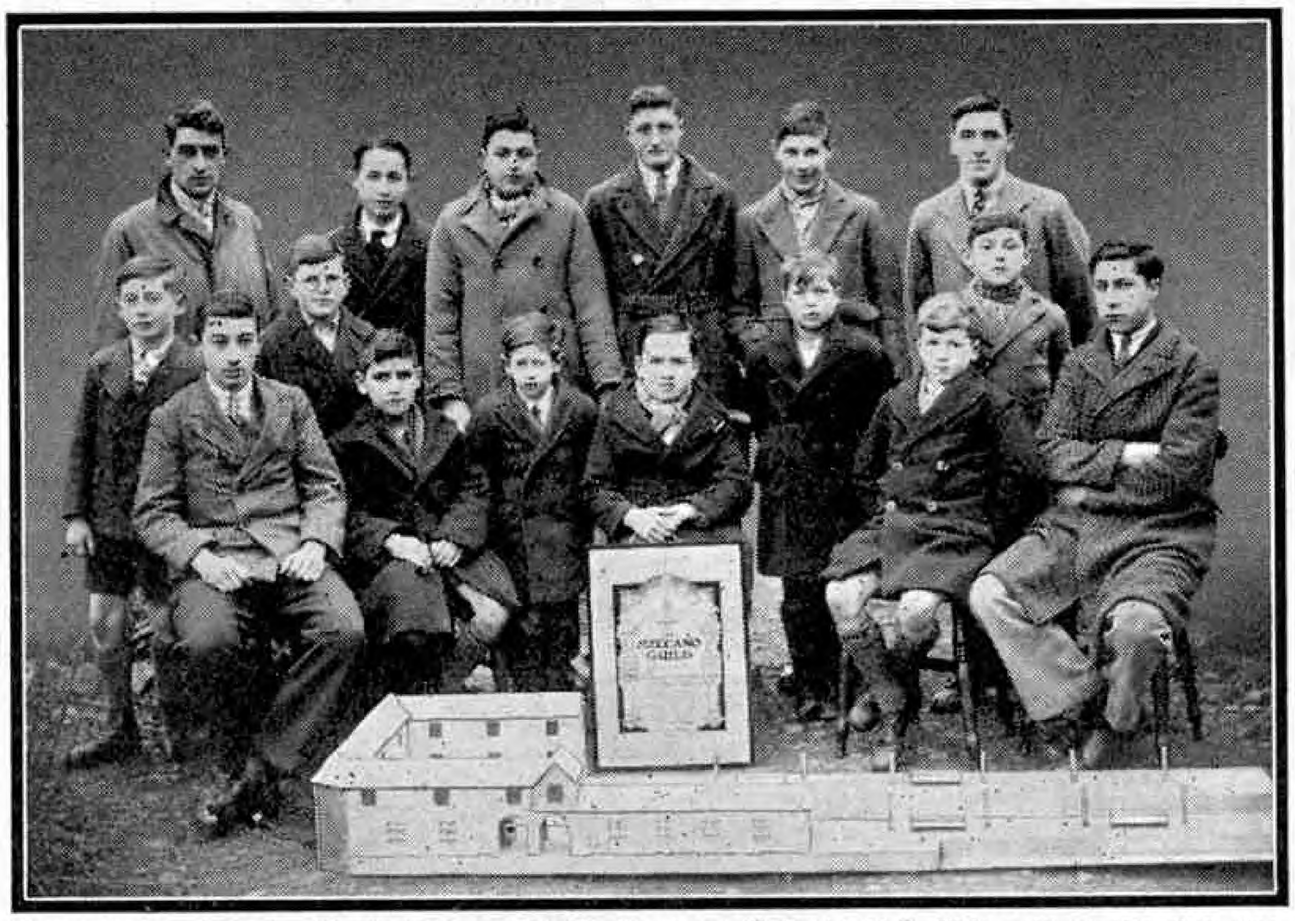
St. Oswald's (Norbury) M.C.—Many new members have been enrolled, and great interest is being taken in model-building, the chief activity of the club. An exchange market has been started, and a Library is to be opened shortly. Club roll: 21. *Secretary:* R. H. Smart, 14, Kensington Avenue, Thornton Heath, Surrey.

Burnley Grammar School M.C.—A Lantern Lecture on "*Colour Photography*," in which the Lumière Process was described, was illustrated by many interesting slides. A visit has been paid to the Rosegrove (L.M.S.R.) Motive Power Depot, where the party saw locomotive repairs being carried out, and inspected the new automatic coal hopper. A special model of a stiff-leg derrick has been completed. Preparations are in hand for a Hobbies Exhibition that will include a street scene, a fairground, and a factory. Club roll: 21. *Secretary:* J. S. Keighley, Grammar School, Burnley.

Mount Senior Boys' School (Newark-on-Trent) M.C.—The membership is increasing very satisfactorily, and extensive constructional work has been carried out by both the Meccano and Hornby Train Sections. The club has been visited several times by the local Education authorities, who are pleased with the progress made. The club is organising its first Exhibition, and a visit is to be paid to the L.M.S.R. Locomotive works at Derby. Club roll: 44. *Secretary:* A. Priestley, 35, Gainsborough Drive, Newark-on-Trent.

Colchester M.C.—The club recently moved into larger quarters, where there are improved facilities both for model-building and for games. The senior members have built a large Roundabout, which will be driven by a Meccano Steam Engine. The many models completed by the juniors have included aeroplanes and motor vehicles. Talks by members are being arranged, and plans are in hand for an Exhibition. Club roll: 16. *Secretary:* E. J. Tracey, 199, Harwich Road, Colchester.

Fraserburgh M.C.—The Annual Party was a great success. During an interval in the programme, presentations were made to the Leader and his wife by the secretary, on behalf of the members. The Party was held at the West Manse, where several members attended the following morning to assist in removing the equipment. Club roll: 23. *Secretary:* W. J. Dawson, Phingask, Fraserburgh.



Some of the officials and members of the St. Stephens (Saltash) M.C. This enthusiastic club was affiliated in June 1935, and carries on an extensive model-building programme. Lighter fare is provided by the playing of games for a short time during each meeting. A Branch of the Hornby Railway Company is associated with the club.

Exeter M.C.—The recovery of many members from influenza, has resulted in the normally good attendances being regained, and there has been much activity in model-building. Models completed have covered a wide range, and have included ships, cranes, a dynasphere, lion cage and a reproduction of the Exeter Guildhall. Excellent wooden models of a Handley Page air liner and a Miles "Hawk Major" aeroplane have been made. Club roll: 37. *Secretary:* E. Ashwood, 188, Pinhoe Road, Exeter.

Barnard Castle School M.C.—The new club-room is much appreciated, and excellent track meetings have been held, during which interesting railway operations were carried out. Preparations have been made for the club's first Anniversary Display. Club roll: 11. *Secretary:* S. W. Telfer, York House, The School, Barnard Castle, Co. Durham.

Cold Harbour M.C.—Good progress is being made by this young club. The first Lantern Lecture was held recently, and described and illustrated "*The Railways of Britain.*" Model-building is being carried on with great zeal. Club roll: 11. *Secretary:* R. S. Hill, Anstie Farm, Holmwood, Surrey.

Bishop Road Boys' School (Bristol) M.C.—There is evidence of increasing interest and activity since the club was affiliated recently, and some excellent models have been built. Club roll: 50. *Secretary:* D. Pavey, 20, Highberry Grove, Bristol, 7.

Mary Swanwick School (Chesterfield) M.C.—A recent outstanding event in a busy session was a fish and chip supper, to which all present did full justice. After a hearty meal, the members formed two groups, one of which played table games and the other concentrated upon a model electric railway. Mr. Dinner, one of the vice-presidents of the club, was present on this notable occasion. Club roll: 18. *Secretary:* K. Leatherday, 128, Church Street, Old Whittington, Chesterfield.

Plymouth M.C.—The first Open Night in the long history of the club has been held, and was a great success. A Meccanograph kindly lent by Headquarters greatly interested all present, and the new printing press acquired by the club last autumn was seen for the first time by visitors. Later in the evening the parents and friends of the members gathered in the main club-room, where a Concert was given by the members. Club roll: 72. *Secretary:* R. G. Symons, 47, Lisson Grove, Mutley, Plymouth.

St. Stephens (Saltash) M.C.—At one Model-building meeting, the members combined their Meccano outfits to build a cross-Channel steamer. Some evenings are devoted to making cardboard models. A Party to encourage new members was very successful. A band was engaged, and the secretary conducted a raffle to aid club funds. Table Tennis continues to be very popular. An orchestra of five players has been formed. Club roll: 16. *Secretary:* B. Braund, 9, Homer Park, Saltash.

Morison Memorial (Glasgow) M.C.—This club is progressing very well. Members are grouped into sections named Meccano, Hornby, Woodwork, Wireless and Aeroplane respectively, and a constructive programme is carried out enthusiastically by each section. Occasionally a Games Night is held. Club roll: 75. *Secretary:* D. Elder, 131, Dumbarton Road, Clydebank, Scotland.

"The Beeches" (Jersey) M.C.—Attendance has been much lower than usual owing to many members being victims of influenza. Interesting meetings have been held, however, and the best models produced during a recent Model-building Evening were a motor car lifter and a speed boat. A Lantern Lecture on "*The Railways of Britain*" has been given. An Exhibition is to be held in the School Hall. Club roll: 21. *Secretary:* P. Titcombe, 3, Thornleigh, Bagatelle Road, St. Saviour's, Jersey, C.1.

Whitgift Grammar School (Croydon) M.C.—The membership and attendance have increased slightly. Great interest is being taken in the preparations for an Exhibition, at which Meccano models, and aeroplanes and motor cars built with Meccano Constructor Outfits, will be displayed. A special feature is to be a Dinky Toys layout that will include a road complete with traffic signals, etc. An interesting Lecture on "*Gear Wheels in Meccano*" has been given. Club roll: 56. *Secretary:* A. F. Jordan, 16, Old Farleigh Road, Selsdon.

NEW ZEALAND

Ashburton M.C.—The past club year has been highly successful, and steady progress has been made. Attendance at meetings has been very good and 12 new members have been enrolled. Model-building activities have been extended, and the Hornby layout has been improved to enable more complicated operations to be carried out. A Party was held to celebrate the 13th birthday of the Leader's son. A Picnic to Ashton Beach was much enjoyed. Club roll: 20. *Secretary:* Miss M. Kruse, 83, Eton Street, Ashburton.

Clubs Not Yet Affiliated

Barking M.C.—Weekly meetings have been held at the home of one of the members. Steps are being taken to obtain a schoolroom for use as a club-room, and the larger accommodation will make it possible to enrol several Meccano enthusiasts who wish to become members. Club roll: 7. *Secretary:* L. D. S. Thomas, 268, Ripple Road, Barking, Essex.

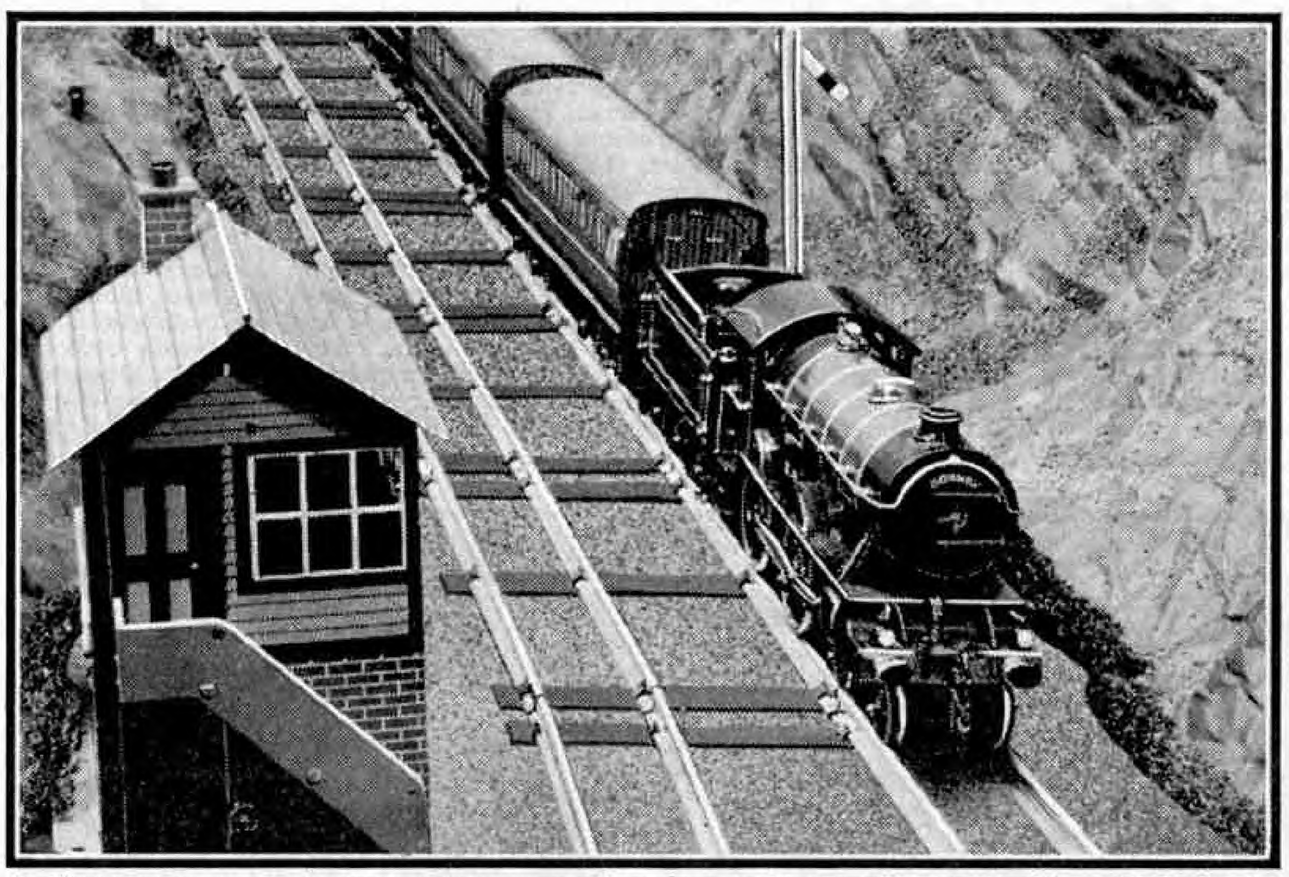
Folkestone M.C.—Much constructional work has been carried out by the Meccano section for the Hornby layout of the H.R.C. Branch associated with the club. Club roll: 5. *Secretary:* F. E. Saunders, 79, Dover Road, Folkestone, Kent.

Scenic Effects on Model Railways

Good Results from Simple Methods

THE arrangement of suitable scenic effects on miniature railway systems is one of the most frequent topics of correspondence between H.R.C. members and the staff at Headquarters. A railway that consists merely of the track and various accessories, no matter how well arranged and efficient it may be, is never very effective in appearance. It seems to be situated "nowhere in particular," for the natural lineside features that we see on any journey are missing. The addition of miniature hedges, trees, and banks at the side of the line makes a wonderful difference, however. The range of Hornby Accessories includes suitable items and excellent effects can be secured by their use.

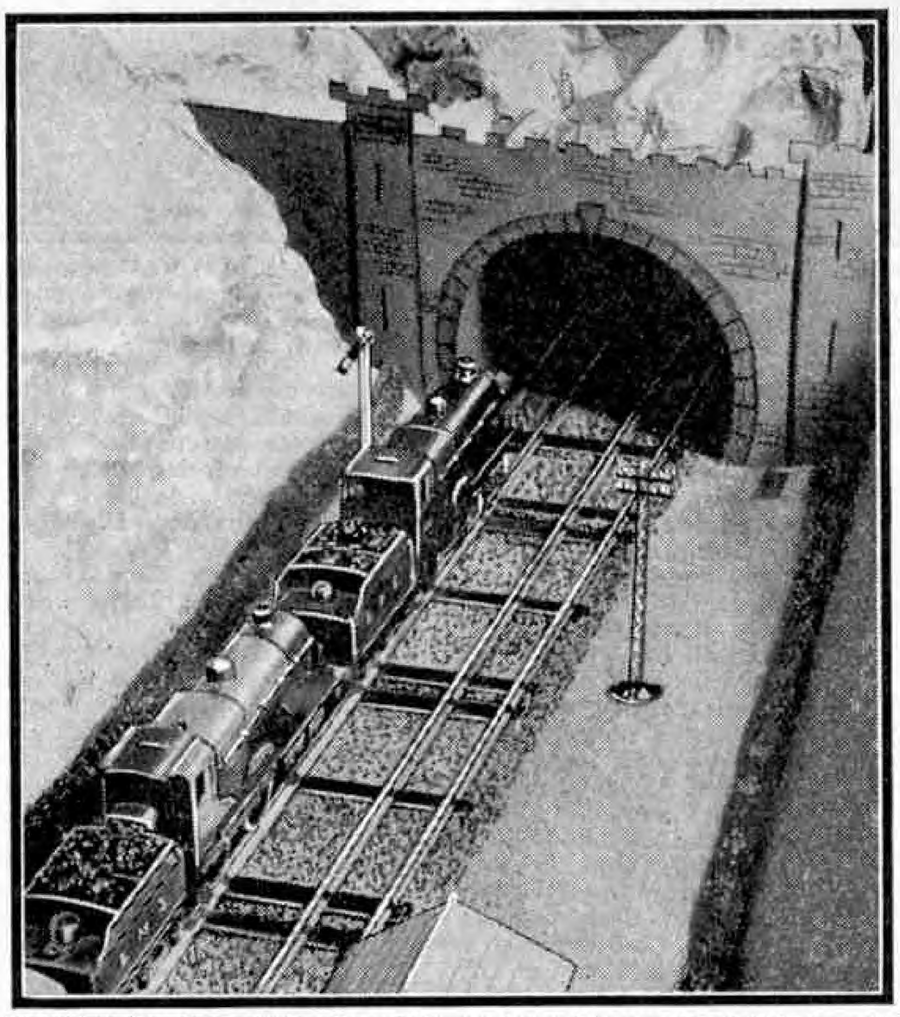
The Hedging can be used to border the railway property, and to divide up lineside surroundings into fields or roads. Each section of hedging is mounted on a narrow wooden base, so that it can be put down as required and then taken up again if necessary when any alterations to the layout are made. The standard length of each section is 10¼ in., the same length as that of a Hornby Straight Rail. It is therefore easy to find out how many sections of Hedging are required alongside a given length of track.



A miniature express train in effective surroundings. Hornby Hedging borders the line, and the banks of the cutting are formed of brown paper treated as described in this article.

The Hornby Trees are manufactured in two kinds, representing oaks and poplars respectively. They are complete with neat stands that make it easy to place the trees where required, and their positions can be altered when necessary.

Coming now to the "earthworks" that are required at the side of the line, the Hornby Cuttings are particularly useful. Several different Cuttings are available, commencing with the No. O Cutting, which consists of two cutting "banks" mounted on a base. The track is laid through the space between them, this space of course representing the actual cutting. Cuttings Nos. 1 and 2 are particularly interesting in that they form separate sections of a cutting bank that can be extended to any length by additional sections. Cutting No. 2 is intended to form the centre portion of this, while Cutting No. 1 is made to slope downward, this component being used at the end of the main No. 2 sections. Cutting No. 3 also is a centre section, but is curved to make it suitable for use alongside curved tracks. In Cutting No. 4 a return is made to the double type of Cutting No. O, the chief difference being the larger size of the No. 4 Cutting.



Entering the tunnel! Cardboard is used for the mouth of this tunnel, which is situated in "mountainous country."

These accessories provide in a simple and ready-made form a means of arranging effective lineside scenery. As they are self-contained, they are particularly suitable for layouts that have to be cleared away after use, but they can equally well be used on systems that are arranged in a permanent manner. On such railways it sometimes happens that special features of lineside scenery are required. Perhaps a cutting of greater depth than usual may be necessary; or its banks may be required to slope upward to meet and form a "hill" through which the railway is carried in a tunnel. It is then that the model railway owner has to exercise his skill and patience in the construction and arrangement of the items desired.

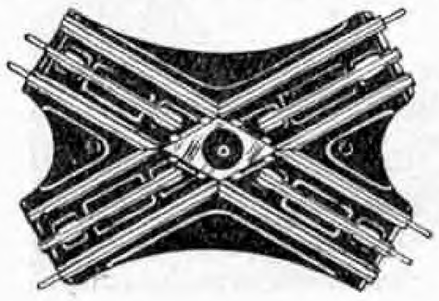
It is often thought that the making of scenery is a difficult business, but good results can easily be obtained with a little care and patience. A favourite method of arranging lineside hills, banks, and other features is to make up an irregular framework of wood, which is covered over with rough brown paper that has been crumpled, soaked in paste and then spread out again. The paper takes on a shape of the woodwork foundation, and its stiffening by the paste causes it to retain the required form. It can be secured to the baseboard by drawing pins, and a few fine nails may be required to fix it to the wooden framework. When scenery of this kind has been secured in position and set, it should be painted in order to make it look realistic. The painting should be carried out in flat colours, as enamel will dry with a more or less shiny surface that would not look natural. No attempt should be made to get the colour even, splashes of different shades here and there to represent rock, soil, sand or wild flowers giving the best effects. A little sawdust or sand can be sprinkled on this to represent a stony surface if required.

Cardboard also is useful to the miniature railway engineer. Various buildings and structures can be reproduced by its aid. It requires a little care in its management, but if trouble is taken no difficulty should arise and a well-built cardboard structure will have a surprisingly long life. It is important to mark out the card carefully according to the measurements and the design of the accessory to be constructed. The cutting out of the various parts is best done with a sharp penknife, a steel rule or Meccano Strip or Girder being used as a straight edge to guide the knife. Seccotine is the best material for the assembly of the various parts, and it is a good plan to stiffen any broad flat surfaces by sticking a strip of wood on the inside of them.

If the miniature railway is to be truly realistic, a scenic background is a desirable addition. Sometimes it is possible to obtain a wallpaper frieze showing a landscape, although these are rather rare these days. The alternative is to make a suitable background, and this is by no means difficult. The chief features can be represented in paint or coloured chalk on a background of plain blue wallpaper. This method has the great advantage that the scenic background can be made to suit exactly the requirements of the railway. For instance, if a Level Crossing is incorporated in the track, the roadway leading to it will appear in the scenery in a realistic manner. General effects only should be aimed at and an excess of detail avoided.

Points and Crossings in the Hornby Series

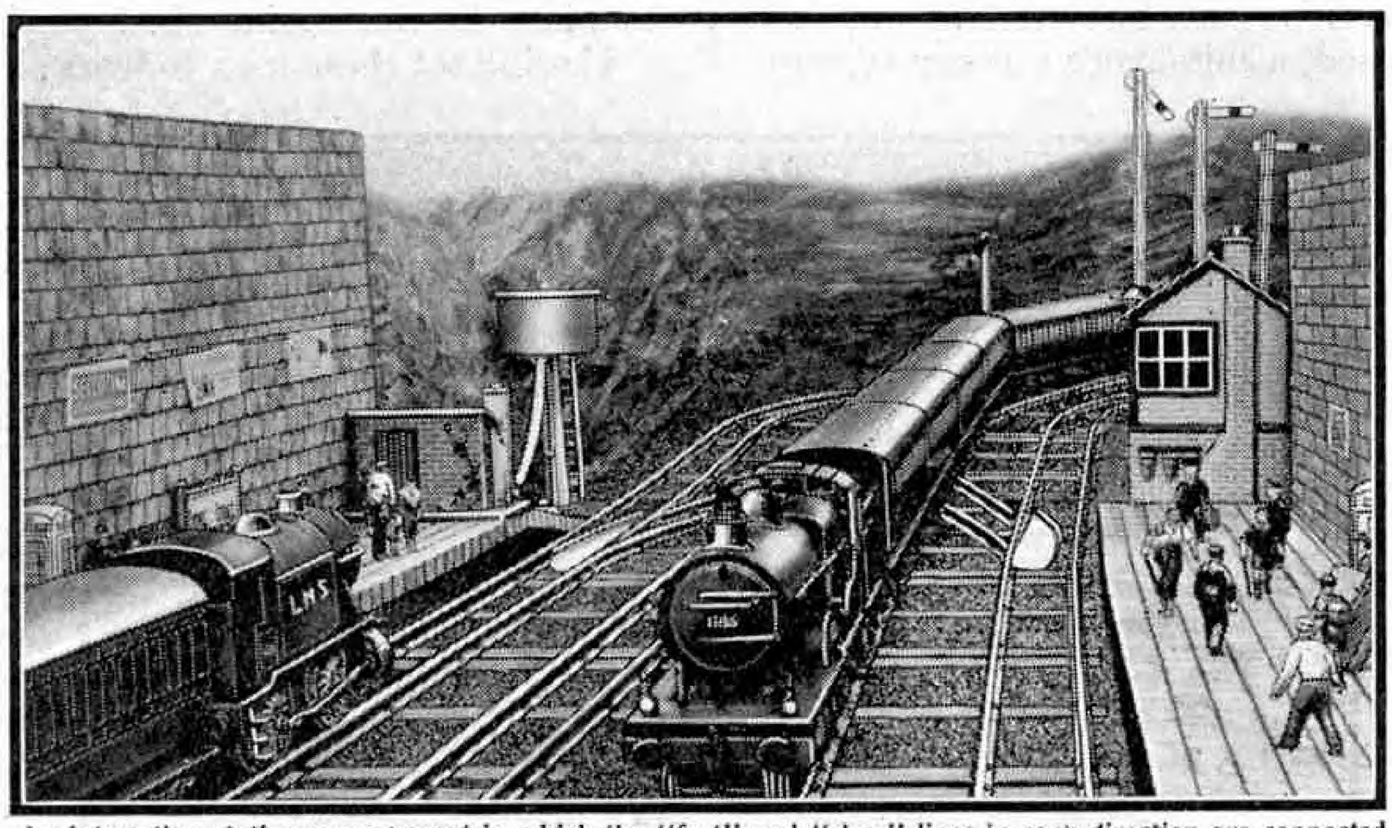
By "Tommy Dodd"



ECA electric Acute-angle Crossing.

MINIATURE railway owners do not long remain satisfied with operations on a small circular or oval track. They soon begin to develop their layouts on real railway principles, and then find that Points are necessary. Several varieties of Points are available in the Hornby Series. These include Right-hand and Left-hand Points, Double Symmetrical Points, Parallel Points and Crossover Points.

The ordinary Right-hand and Left-hand Points are probably the most useful, and they can be used for many different purposes. Each type consists of a length of straight rail from which a curved branch leads off, to the right in one case and to the left in the other. Trains therefore can be diverted with their aid from a straight main line on to a branch line, according to the wishes of the operator. The "hand" of the Points is determined by the direction of the curved branch when the Points are looked at from the "facing" end, that is the end at which the switch rail unit is situated. The actual course of a train is determined by the manner in which the switch rails are set. For instance, if it is desired to run a train straight along the main line, they must be set for the straight by manipulating the lever at the side of the track. Then they allow the train to continue along its original course, the flanges of one set of wheels passing along the straight stock rail, while the opposite wheels will pass along the straight switch rail. When the train is required to run on to the curved branch the switch rails are moved by the point lever so that the curved switch rail comes into use. One set of wheels then pass along the switch rail, the opposite ones following the corresponding stock rail.

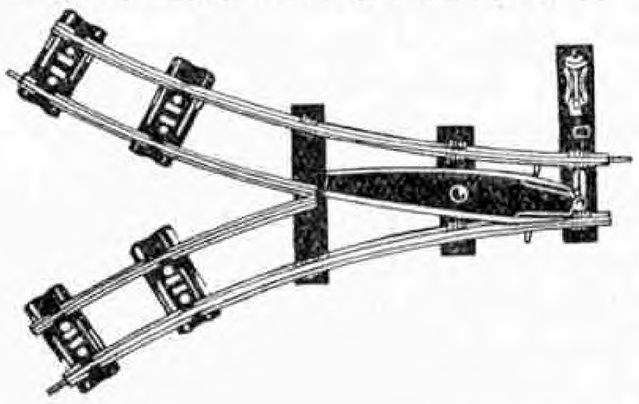


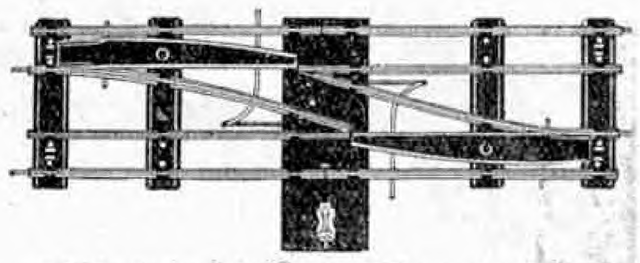
An interesting station arrangement in which the "fast" and "slow" lines in each direction are connected by means of Hornby Crossover Points. The "walls" of the station are made of wood faced with brick paper.

In addition to being used for running lines branching off the main track, Hornby Right-hand and Left-hand Points can be used for making up any number of sidings. One set of Points is used to lead off from the main line and once the position of them has been determined, it is an easy matter to arrange further Points to provide access to the actual shunting or storage sidings themselves.

The Double Symmetrical and Parallel Points in the Hornby Series embody the same working principles as the Points mentioned previously, and their operation is exactly similar. The Double Symmetrical Points differ from the ordinary Right-hand and Left-hand Points in that both tracks available to a train approaching them in the facing direction curve away from one another. Double Symmetrical Points can be used for leading two tracks away from a single length of straight track; alternatively, they are very useful for making up a triangular section of track by joining all the curved arms together. Such triangle junctions can be used to great advantage on layouts on which there is sufficient space to accommodate them. The Parallel Points also are very useful. Their main object is to lead a single line into two parallel straight tracks, which can join up to the rails of a Hornby Engine Shed, the No. 2 type Level Crossings, or to straight or curved sections of Hornby Double Track to form main line passing loops or station loop lines.

DSL2 clockwork Double Symmetrical Points.





COR2 clockwork "facing" Crossover Points.

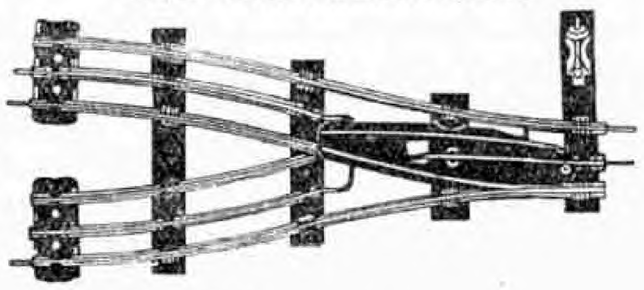
Crossover Points are intended primarily for making connections between the up and down tracks of a layout. They consist therefore of two sets of points, one set being situated in each track, having a common rail connection between them. Thus they incorporate two switch rail units, and these are controlled together by a single lever of the usual type. When both sets of switch rails are set for the straight run, trains on the main lines are not affected; but when they are set for the connecting line between two tracks a train can be transferred from one line to the other. There are two varieties of them, Right-hand or "facing" Crossovers, and Left-hand or "trailing" Crossovers. The "facing" Points are those that face a train approaching on the left-hand line of Double Track, and allow it to pass straight on or to be diverted to the adjacent track. The "trailing" type are those that join the left-hand line from the right in the direction from which the train is travelling.

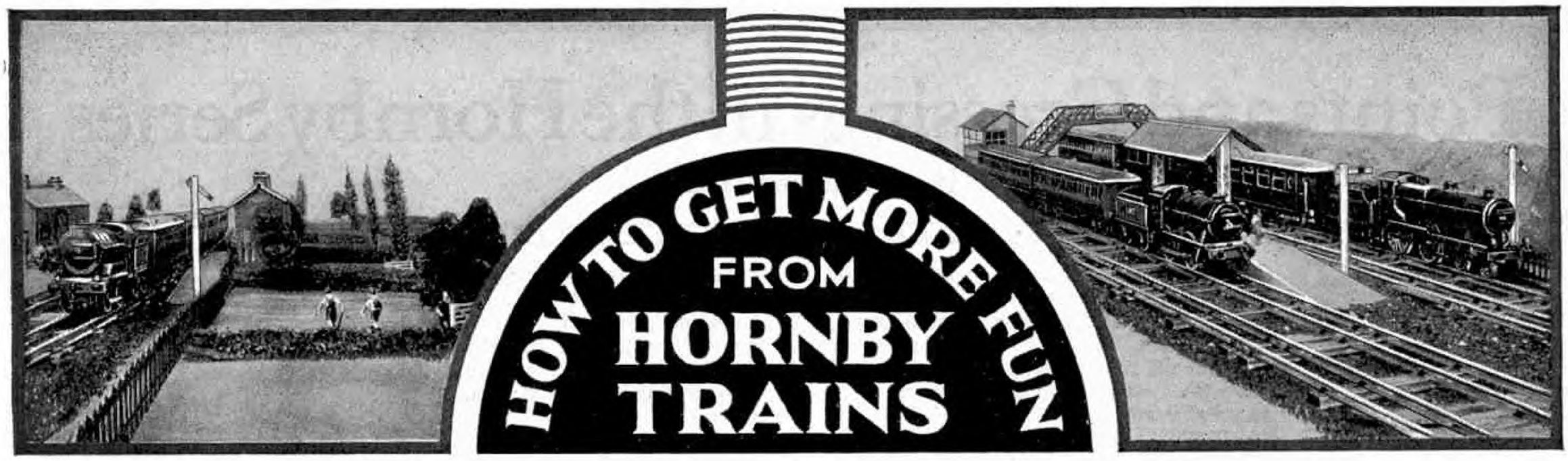
The "six-foot way," or the distance between the two tracks is the same as that of Hornby Double Track. These Points therefore can be used in any double track layout. The centre illustration on this page shows how the Crossover Points are used at the approach to a large station. In addition Crossover Points can be laid in miniature railways to form sidings or run-round loops instead of using Right-hand or Left-hand Points. The latter in fact require slightly more space as they make the distance between adjacent lines greater. In order to make a loop line for continuous running Right-hand and Left-hand Crossover Points are required.

Crossings are the next items for our consideration. Frequently it is required to take one track across another on the level within a restricted space. This is made possible by means of Crossings. On some layouts the same effect can sometimes be obtained by the use of Points, but the space required is greater than where a Crossing is used. Crossings differ from Points in another important respect; there are no moving parts requiring to be set so that the train traversing a Crossing has no choice of routes. There are two types of Crossings in the Hornby Series, the Acute-angle Crossing and the Right-angle Crossing. By means of the Acute-angle Crossings the tracks cross one another at an angle of 60 degrees. This arrangement makes it possible to use these Crossings in conjunction with 2 ft. radius curved rails to form figure "8" layouts, several examples of which will be found in *""Hornby Layouts—100 Suggestions."*

The Right-angle Crossings are constructionally the same as their Acute-angle counterparts and they, as their name implies, are used in situations where it is desired to take one line across another at right-angles on the level. Situations of this nature do sometimes occur and even the crossing on the level of two main lines is seen at Newark where the L.M.S.R. and L.N.E.R. lines intersect.

EPPL2 electric Parallel Points.





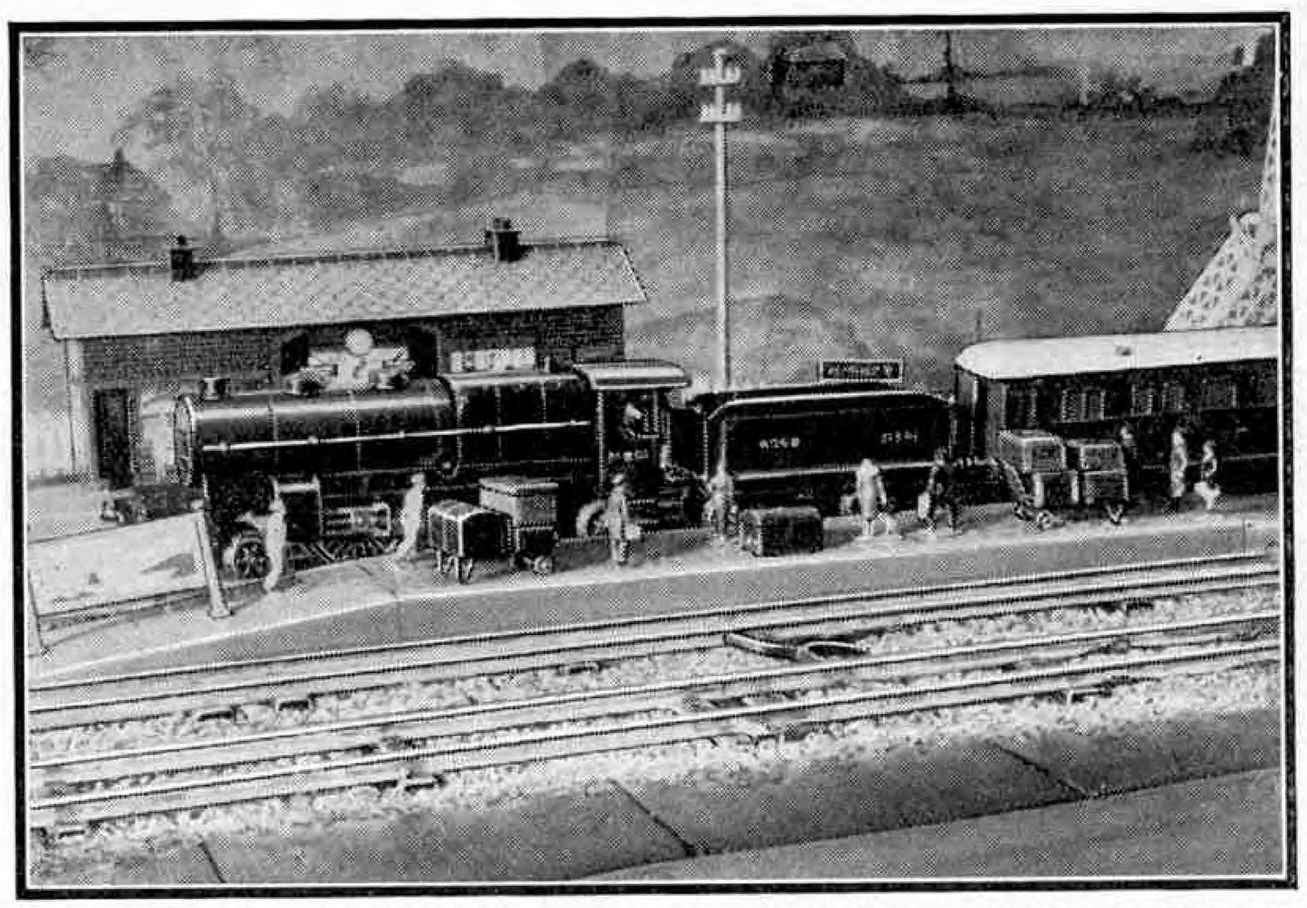
IMPROVING THE APPEARANCE OF A LAYOUT

A MINIATURE railway has such a varied appeal, that some fresh attraction is always presenting itself to the railway owner. Even when the line is complete with accessories, and trains can be run on it quite satisfactorily to a regular scheme of working, there is still much to do in order to improve its appearance. For instance scenery must be provided. This is dealt with in an article on page 236 of this issue, but even when good scenery is planned and used, a miniature railway system seems rather a dull affair until we give it the appearance of life and bustle that pervades real railways.

The first step in brightening up a railway is to provide miniature railwaymen to work the trains. A realistic collection of these is available in Set No. 1 of the series of Meccano Dinky Toys. The different figures are also obtainable separately, which is a great advantage and avoids unnecessary duplication. The most important of these miniature railwaymen is the Stationmaster, Dinky Toys No. 1A. In an attitude of calm attention he stands watching the working of his staff, a sheaf of papers—"Special Train Notices" perhaps—held in one hand. Then there is the Guard, Dinky Toys No. 1B, in the act of giving the *"Right away,"* his green flag in one hand and his whistle in the other to warn any "last minute" passengers of the impending departure. The Ticket Collector, Dinky Toys No. 1C, is keenly alert and looks most effective when placed by the entrance to the platform, his "nippers" held in one hand ready for punching tickets. When traffic is heavy several of these men can be used together in order to deal with the crowds. With the ticket nippers carefully filed away, the ticket collector figures can also be used in several other ways; as for instance in handling luggage barrows, luggage, or milk cans, or as if engaged in closing carriage doors.

The remaining members of the station staff are Porters, Dinky Toys No. 1E and 1F respectively. The former is carrying a bag in each hand; he can be used alone or he can be placed as if attending to one of the passengers. The other Porter is a most useful man; he exhibits every appearance of energy and can be placed as if hurrying along to some job on almost any part of the line. The locomotive Driver, Dinky Toys No. 1F, is instantly recognised by his typical blue overalls and from the fact that he has in his hand an oil feeder. He looks most realistic on or about any engine and is a particularly useful figure to place in the engine shed yard.

Having set these men to work, it is necessary to obtain some passengers so that the railway looks as if it is doing some business. The Passengers of Dinky Toys Set No. 3 are varied in type, a feature that adds considerably to their realistic effect. They include of course a Business Man, Dinky Toy No. 3B, whose appearance is typical of so many passengers; he recalls particularly the familiar morning and evening business services of suburban lines. To supply him with his newspaper there is the Newsboy, Dinky Toy No. 3E, running along in the true manner of his kind with a bundle of papers under his arm. There are two Hikers, Nos. 3C and 3D, who can be making part of their journey by train if used on the station platform, or they can appear at level crossings, on footbridges, or in any likely spot in the lineside roads or fields. The two remaining figures in the Set are ladies, Dinky Toys Nos. 3A and 3F respectively. The first is holding a hand of a child, but the second is alone and evidently on her way to business. Both can be effectively placed on the station platform or elsewhere.



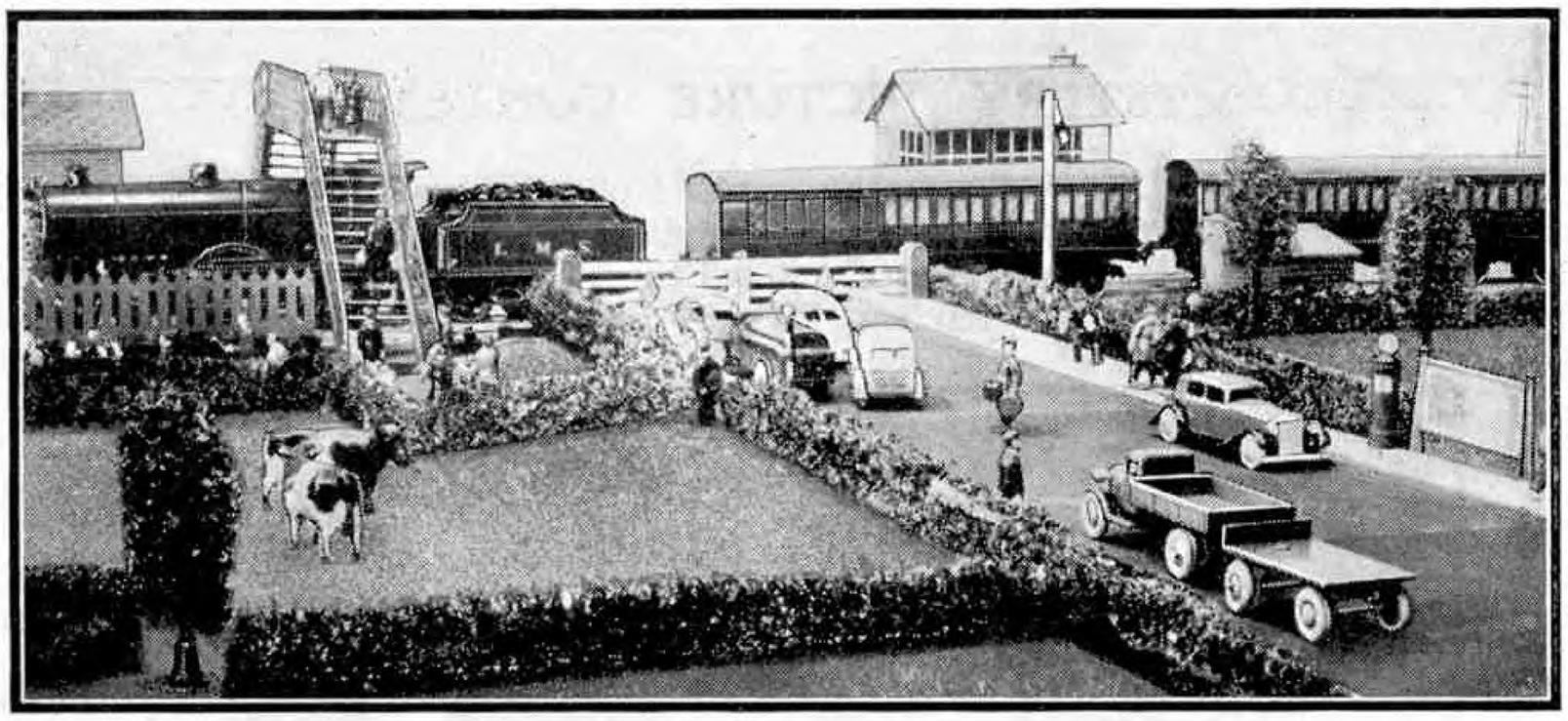
An interesting scene on the Hornby layout of P. Lancaster, of Hull, showing how the Dinky Toy figures give a busy appearance to the station platform. The train is the Hornby Riviera "Blue" express hauled by a Nord 4-4-2 Locomotive.

The various members of the Engineering Staff of Dinky Toys Set No. 4 can all find a place on the miniature railway system. The Electrician, Dinky Toy No. 4A, the Fitters, Dinky Toys No. 4B, and the Greaser, Dinky Toy No. 4D, can be used for several duties apart from those implied by their names. Signalling, permanent way and carriage department jobs can be carried out by them and several examples of each figure may be required. If the railway has a road motor department—and all up-to-date Hornby Railway owners attend to the road transport side

of their business—the Engineering Staff figures can be given the duty of maintaining the various vehicles. The Storekeeper and the Engine Room Attendant, Dinky Toys No. 4C and 4E respectively, will not be required in such numbers as the rest of the Engineering Staff, but they can be employed as if supervising the work carried out by the other men.

Finally we come to the Train and Hotel Staff of Dinky Toys Set No. 5. This Set consists of a Pullman Car Conductor, two Pullman Waiters and two Hotel Porters. These men add to the variety of the staff and will be busily engaged on the station platform before the departure of a train. The Conductor, Dinky Toy No. 5A, is of course an important person, immediately responsible for the comfort of the passengers under his care and for the work of his staff of Waiters, Dinky Toys Nos. 5B. He is distinguished from his men by wearing a white uniform coat; they are attired in typical sleeved waistcoats. The Hotel Porters, Dinky Toys No. 5C are similar to the Porter with bags of Set No. 1, but they wear liveries of their respective hotels and so differ from the other Porter who has railway uniform.

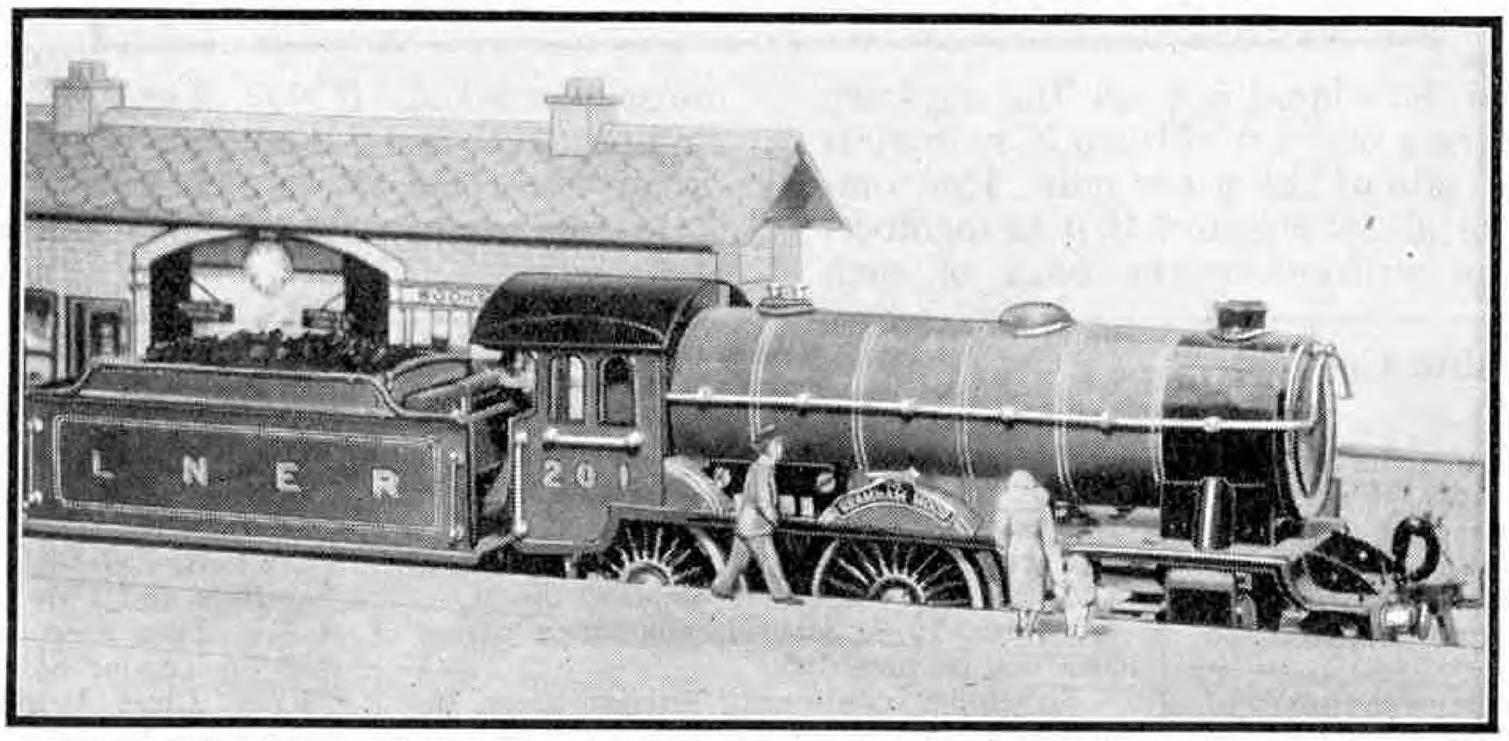
With all these little people to choose from there is no difficulty in giving an appearance of life to the railway. It is still noticeable however that the actual railway premises have rather an empty look about them. The hoardings and advertisement boards displaying the familiar posters that are so bright and colourful nowadays are missing. Fortunately it is easy to remedy this by means of the Hornby Posters, two Series of which are available, each packet containing 51 Posters. These have gummed backs to facilitate their attachment to the Station Hoarding, a useful accessory that can be placed on the platform, on the railway premises, or anywhere at the lineside where publicity is desirable. The Station Hoarding can also be used for timetables which can be cut from suitable portions of a real railway guide. There are also Poster Boards that are made in two sizes to accommodate the Posters, these Boards having turned-over lugs on their top edges to allow them to be hooked on to the Paled Fencings at stations and along the line generally.



Road and rail transport in miniature. The arrangement of the level crossing shown in this illustration is typical of the effective schemes that can be carried out with the aid of Hornby Accessories and Meccano Dinky Toys.

In addition to the Posters of the Hornby Series there are the three L.N.E.R. miniature posters that were referred to on page 63 of the "*M.M.*" last January. A set of four of each of the three posters, making 12 in all is sent to any H.R.C. member who applies for them to the H.R.C. Secretary at Headquarters. Members should not omit to quote their H.R.C. numbers. These posters are too large for use on Hornby Poster Boards, but it is simple to make a suitable support for them from fairly stout cardboard, or from thin wood. Special hoardings also can be made in this way when it is desired to arrange a mass display of posters at any point on the line.

With the railway improved in appearance by these additions the surrounding fields and roads should not be neglected. For the fields the components of Dinky Toys Set No. 2, Farmyard Animals, and the Shepherd Set, Dinky Toys No. 6, are obvious suggestions. The Shepherd, Dinky Toy No. 6A, his faithful Dog, Dinky Toy No. 6B, and the flock of Sheep also can appear on the road in country districts. If required he can also be made to take charge of a herd of Cows, Dinky Toys No. 2B; he should then have the upper part of his crook removed, the lower portion then forming a handy stick to assist him in managing the animals.



A familiar station scene in miniature. A youthful railway enthusiast and his mother, Dinky Toy No. 3A, admiring a Hornby L.N.E.R. "Hunt" class Locomotive "The Bramham Moor." One of the "enginemen" also is seen.

For the actual traffic on the road there is a great selection of Dinky Toy vehicles of all kinds. For the railway-operated traffic, the Mechanical Horse and Trailer Van, Dinky Toys Nos. 33R, is the first choice, but other vehicles of commercial types can also be considered as railway-owned. Private cars and such special vehicles as the Ambulance and Fire Engine, Dinky Toys Nos. 24A and 25H respectively, should all find a place in the general traffic in the neighbourhood of the line. Some particularly effective scenes can be arranged outside the railway station; possibly a car park can be worked into the general scheme. In any case however a row of cars drawn up by the station will look realistic.

To control and direct the traffic there are the Police components of Dinky Toys Set No. 42 and the R.A.C. and A.A. men of Sets Nos. 43 and 44. In addition there are many other familiar street features.

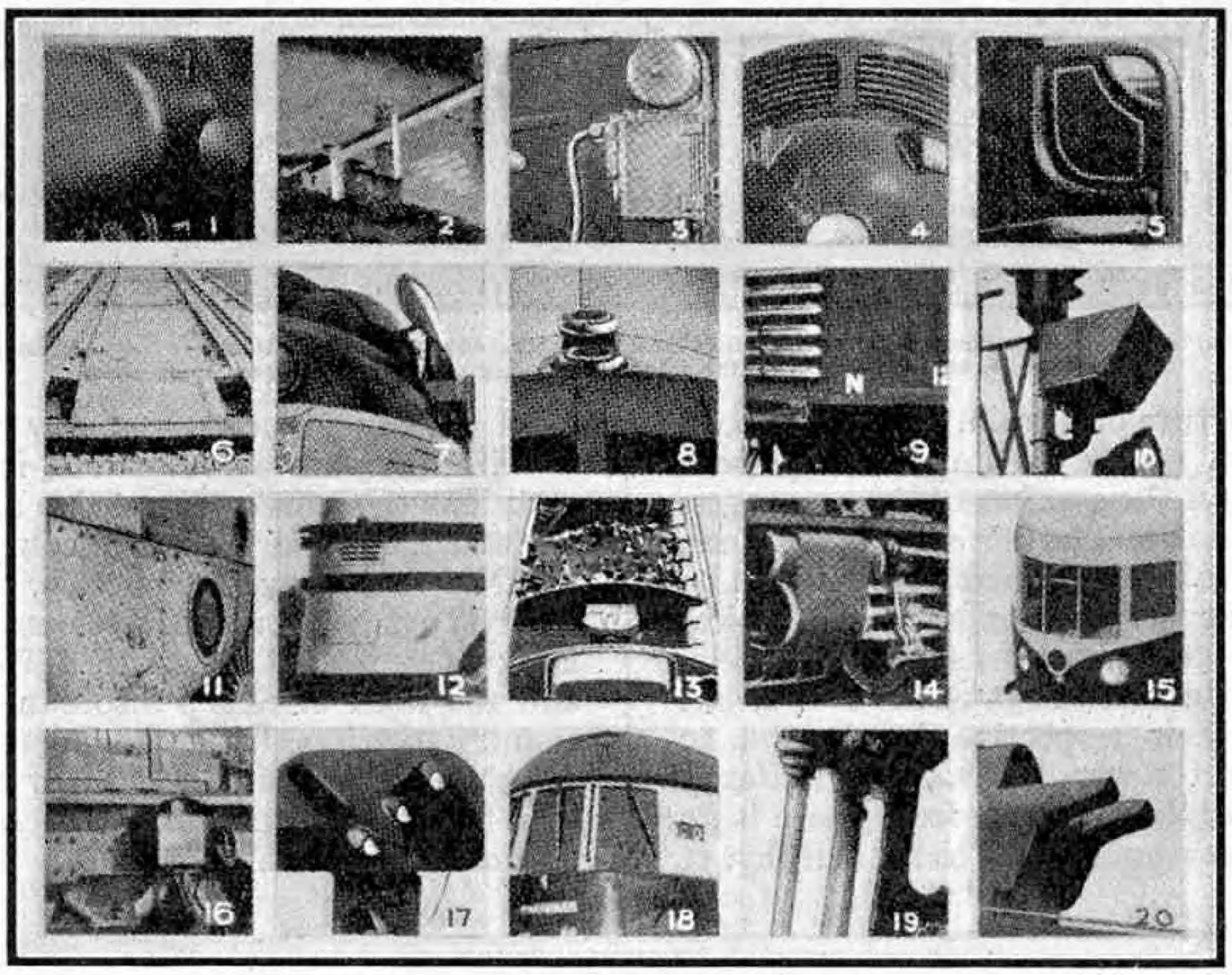
H.R.C. COMPETITION PAGE

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

MYSTERY PICTURE CONTEST

For our competition this month we have a picture puzzle that covers many branches of railway working. The illustration on this page consists of 20 small pictures, taken from photographs of locomotives and tenders, rolling stock, and track and lineside features of British and overseas railways, and we ask competitors to identify the items shown in them. In each case sufficient information should be given to identify the picture, and the railway concerned must be named where the subject illustrated belongs to any particular company. Competitors should not go into great detail, however, and solutions should be as short as possible while giving all the information required. A few words should suffice for each picture.



When a competitor has identified all the mystery pictures, he should make a neat list of them in numerical order, writing on one side of the paper only. The competitor's name, full postal address and H.R.C. membership number must be written on the back of each sheet of paper used. No member should hesitate about sending in an entry, even if he is unable to identify all the 20 fragments that make up the complete puzzle, for there are many prizes and other members sending entries may not be any more successful.

The contest will be divided into two sections, Home and Overseas, and prizes consisting of any products manufactured by Meccano Ltd. to the respective values of 21/–, 15/– and 10/6 will be awarded to the three best entries submitted in each section. In addition a number of consolation prizes will be awarded to those members whose entries are not among the winners of the major prizes, but nevertheless deserve some reward for their efforts. Envelopes containing entries must be marked *"H.R.C. April Mystery Picture Contest"* and posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 30th April. The closing date for competitors in the Overseas section is 31st July.

Railway Photographic Contest No. 1

This month we are announcing the first Photographic Contest of the 1937 series, and in view of the great popularity of competitions of this kind in previous years, we are sure that members will welcome the decision to begin these contests so early in the season.

Competitors may send any number of railway photographs, and these may have been taken during the winter months or prepared specially for this contest. As in previous contests of this kind, there are no restrictions, except that the actual exposure must have been made by the competitor himself; the developing and printing may be the work of a professional. It is important that every print submitted should have on the back a short description of the scene of the photograph, together with the competitor's name, his H.R.C. membership number, and his full postal address. Prize-winning photographs will be filed for possible use in future issues of the *"M.M."* Competitors desiring their entries to be returned should send a stamped addressed envelope of suitable size. Prize-winning entries become the property of Meccano Ltd., and are not returnable.

The contest will be divided into two sections, Home and Overseas, and in each will be awarded three prizes consisting of any product manufactured by Meccano Ltd. to the respective values of 21/–, 15/–, and 10/6. Several consolation prizes also will be awarded.

Envelopes containing entries must be marked *"H.R.C. Photo Contest No. 1"* and posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 30th April. The closing date for competitors in the Overseas section is 31st July.

December "Mystery Locomotive Contest" Solution

The ingenious concealment of some of the locomotive parts gave competitors a difficult task to perform, but on the whole the entries submitted were very good. The correct solution is as follows: Driving Wheels and Motion (G.S.R.(I) Mixed Traffic 4-6-0); Bogie (G.W.R. "King" Class 4–6–0); Smokebox and Chimney (*"Cock o' the North"* 2–8–2); Front Wheel Splasher and Nameplate (L.N.E.R. "Sandringham" Class, 4–6–0); Boiler, Firebox and Cab Roof (L.M.S.R. *"British Legion,"* 4–6–0); Cab Side and Window (L.N.E.R. *"Green Arrow,"* 2–6–2); Rear Sandbox and Pipe (G.W.R. "King" Class, 4–6–0); Rear Step (L.M.S.R. "Compound," 4–4–0); Tender Side and Chassis (G.W.R. "King" Class, 4–6–0); Tender Top (L.M.S. 4,000 Gal. type).

COMPETITION RESULTS

HOME

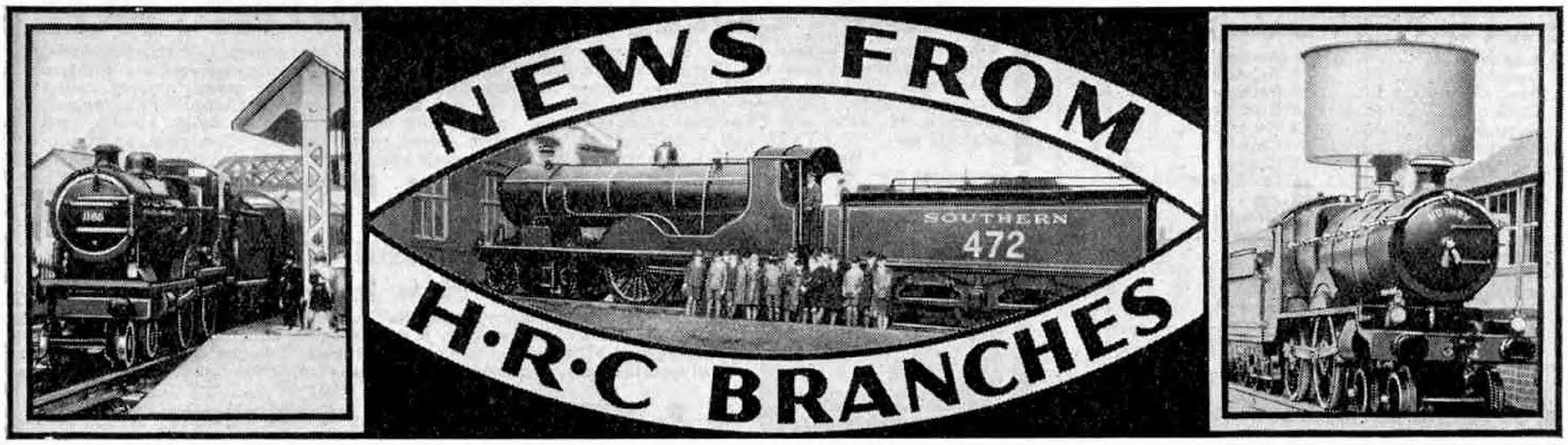
February "Missing Words" Contest.—First: A. W. R. Coomber (8098), Bedford. Second: R. Burrows (6144), Wembley. Third: H. S. G. Darke (4461), London, N.W.11.

February "Locomotive Drawing Contest."—First: A. Sunderland (52500), Cheadle Heath. Second: H. Tattersfield (52042), Dewsbury. Third: D. Mitchell (19991), Huddersfield.

OVERSEAS

November "Layout Planning Contest."—First: M. P. Senji (18118), Madras. Second: D. Murison (37642), Buenos Aires. Third: P. Chapman (24873), Christchurch, New Zealand.

November "Word-Building Contest."—First: M. P. Senji (18118), Madras. Second: H. C. Key (24764), Calcutta. Third: R. Kibblewhite (52902), Featherston, New Zealand.



Branch News

NORTHAMPTON.—There have been record attendances at recent meetings. Track working to timetables devised by members has been successfully carried out, and shunting competitions have been keenly contested. Games Nights are very popular, and great rivalry exists between the sections of the Branch. Members debated the question: *"Are British Railways Superior to those in America?"* A savings fund for Summer outings has been inaugurated. Preparations are being made for an Exhibition to be held at the Northampton Y.M.C.A. "Spring Fair." Secretary: D. K. Adams, 8, Cedar Road, Northampton.

WANDSWORTH No. 1.—The members of this newly-formed Branch have been busy constructing wooden benches and laying the Branch track on them. Experimental trains have been run successfully. The track is to be wired in connection with an illuminated signalling chart that will greatly assist operations. The present Branch room is suitable in many ways, but is small, and enquiries therefore are being made for a larger one. Secretary: A. H. Walker, 68a, Oakmead Road, Balham, London, S.W.

PRIORY (HIGH WYCOMBE).—Excellent work has been put in by members during recent months. The track has been relaid, and the introduction of additional locomotives and rolling stock has greatly improved operations. Members have constructed many realistic accessories, including platforms painted in appropriate colours, crates of Fyffe's bananas, houses made from cardboard boxes, fences and hedges. Both timetable and open working have been carried out, and many interesting trains have been run. A special effort is being made to recruit Hornby enthusiasts living in the district. Secretary: J. T. Cosgrove, 54, Priory Road, High Wycombe, Bucks.

ARDSLEY.—The Branch track has been relaid, and after preliminary runs, a joint L.N.E.R. and L.M.S.R. service has been introduced. This represents the service between Sheffield and Barnsley. In addition to regular timetable working, excursion trains are run between these stations. Block instruments, telephones and bells are being overhauled. A bank has been formed to enable members to save money with a view to obtaining Hornby railway components. Secretary: D. Sharland, 32, New Street, Ardsley.

UNIVERSITY COLLEGE SCHOOL (LONDON).—This Branch has only recently been formed, but has already held interesting track meetings at which excellent running operations were carried out. A visit has been paid to King's Cross Locomotive Depot where members inspected one of the new streamlined locomotives. A visit also has been planned to a local Telephone Exchange. Secretary: H. Mayer, 47, Corringham Road, London, N.W.11.

DOVER.—The Branch has been reorganised in accordance with suggestions made by members themselves, principally for the purpose of improving timetable working. Members have been tested for



Master J. Burley, Chairman of the Plymouth H.R.C. Branch No. 37, wearing the official Chairman's badge. The Branch will this year celebrate its 10th Birthday. Burley also is an enthusiastic member of the associated Plymouth M.C., and carries out very efficiently the duties of the offices he fills in the two organisations.

alertness in train control, and special operations have been devised that have resulted in increased efficiency. Games Nights are to be held, and a visit is to be paid to Dover Marine Station. Secretary: D. F. E. Moore, 48, Folkestone Road, Dover.

EXETER.—Nearly 100 trains a month are being worked by members of this Branch. Passenger and goods services are run alternately, road operations with Dinky Toys occupying the rest of the time at meetings. An extensive network of roads has been laid down, and completely equipped with appropriate models. Members are not yet as efficient as they might be in traffic operations, and the ambulance is frequently called out. The police have effected several arrests in connection with these accidents. Air services also are a feature of the realistic transport operations of the Branch, and a model aircraft carrier constructed of Meccano is used in conjunction with these. Secretary: K. Brewer, 18, Commins Road, Exeter.

SPRING GROVE CENTRAL SCHOOL.—Railway working continues to be enthusiastically carried out at meetings. A small electric layout has recently been introduced, and an interesting joint system has been carried out. The electric track is laid on a fairly steep gradient with a junction at the bottom of the slope and a terminus at the top. Clockwork trains climbing to the upper station are banked by electric locomotives. The Branch has been allotted a class room for its display at the School's Annual Exhibition of Work, and the interesting layout now being designed includes both clockwork and electric systems. Meccano signal control mechanisms and automatic electric cut-outs are being used. Chairman: K. Addinsell, B.Sc., 4, Kenwyn Court, 40, The Grove, Isleworth, Middlesex.

Branches in Course of Formation

The following new Branches of the Hornby Railway Company are at present in process of formation, and any boys who are interested and desirous of linking up with this unique organisation should communicate with the promoters, whose names and addresses are given below:

SOUTHAMPTON—R. Le Piez, 85, Hanefield Road, Swaythling.

MEXBOROUGH—R. A. Agascar, "Woodleigh," Lower Dolcliffe Road, Mexborough, Nr. Rotherham.

NEWTONGRANGE (MIDLOTHIAN)—T. B. Rutherford, "The Saughs," Newtongrange.

DERBY—C. W. Dixon, 51, Bradshaw Street.

WORCESTER—J. M. Rudge, "St. Mary's," Shrubbery Avenue.

Branches Recently Incorporated

318. UNIVERSITY COLLEGE SCHOOL (LONDON).—H. Mayer, 47, Corringham Road, N.W.11.
319. WANDSWORTH No. 1 (LONDON).—A. H. Walker, 68a, Oakmead Road, Balham, S.W.
320. KING'S COLLEGE (TAUNTON).—R. G. H. Williams, "Charteris," Norton Road, Horsell, Woking.
321. SOMERVILLE (NEW BRIGHTON).—F. Reed, 24, Alton Road, Oxton, Birkenhead.
322. RYEFORD HALL (STONEHOUSE).—K. C. Bird, Ryeford Hall, Stonehouse, Gloucester.

SETS (Postage Extra)

20 Australia ...	... 6d.
5 Barbados ...	... 2d.
5 Brit. Guiana	... 3d.
15 Ceylon ...	... 4d.
4 Cayman Is.	... 6d.
3 Charkari ...	... 2d.
5 Cyprus ...	... 3d.
5 Fiji	... 4d.
3 Gibraltar ...	... 2d.
5 Gold Coast	... 3d.
10 ,, ,,	... 6d.
3 Grenada ...	... 2d.
10 Hong Kong	... 5d.
20 India... ...	... 6d.
12 Iraq	... 6d.
10 Jamaica ...	... 5d.
5 Kenya ...	... 3d.
5 Nigeria ...	... 3d.

JUBILEES

1 Australia ...	... 1d.
1 Bahamas ...	... 4d.
1 Bechuanaland	... 4d.
1 Brit. Guiana	... 2d.
1 Cayman Is.	... 3d.
1 Ceylon ...	... 2d.
1 Cyprus ...	... 3d.
1 Gold Coast 1d.	... 2d.
1 ,, ,, 3d.	... 6d.
1 Grenada ...	... 2d.
1 Hong Kong 3c.	... 3d.
1 ,, ,, 5c.	... 5d.
1 ,, ,, 10c.	... 9d.
4 India	... 6d.
1 Jamaica ...	... 2d.
1 Kenya	... 3d.
1 Mauritius ...	... 9d.

J. RUSSELL,
23, SHANKLIN DRIVE, WESTCLIFF-ON-SEA

K. E. VIII & VIMY

Collections of K.E. VIII issues are hardly complete without a souvenir of the only Official Public Ceremony at which he officiated abroad as King of England. We offer 2 Official View Cards, showing all 4 stamps complete (2 Impressed and 2 Adhesives) with special VIMY RIDGE P.O. cancellation, dated UNVEILING DAY at **5/-**. These are REALLY RARE! Fuller details and price lists FREE.

NORRIS & CO. (Dept. M.), NORWOOD, LONDON, S.E.19.

STAMP COLLECTOR'S OUTFIT FREE!

Whether you are a new collector or a seasoned Philatelist, you will find the contents of this wonderful advertising offer of great use. They include: Ruled Duplicate book, in which is incorporated a millimetre perforation measurer, 34 all different stamps (no common Germans), pkt. of stamp mounts, metal watermark finder, 100 Titles of Countries. Amongst the fine stamps are sets of Colonials, Philippines, Bohemia, Hungary, old Canadians (King George), Indians and Australians, also Swiss. Finally, two splendid sets, 5 LATVIA and 5 ESTHONIA. Complete parcel, including 1937 Catalogue, absolutely free. Just send 2d. postage requesting approvals and list of further gifts.

LISBURN & TOWNSEND LTD. (Dept. M.M.), LIVERPOOL 3



FREE Wonderful 1937 offer 20 New Issues and Novelties

Including **Algeria** (centenary), **Bermuda** (Hamilton Harbour), France (new colour), Ivory Coast (head of Native Girl), Jugo-Slavia (**Boy King Peter**), Morocco Agencies (**King Edward VIII**), **Perak**, Roumania (**Air Mail**), **Selangor**, Senegal (bridge), etc. I will send this collection absolutely free to all stamp collectors sending 2d. postage. (Abroad 4d.)

G. P. KEEF, Willingdon, Eastbourne, England.

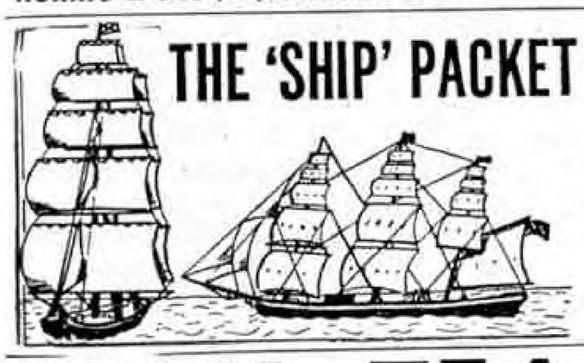
THE "DIAMOND" PACKET IS THE ONLY PACKET

OF UNSORTED STAMPS ON THE MARKET with 15 years' reputation behind it. It contains approx. **1,000 UNSORTED STAMPS** from Convents abroad. **MANY RARE STAMPS** have been found in it. 1 pkt., **1/6**; 3 pkts., **3/9**; 5 pkts., **6/-**. All post free inland. Postage to Colonies 3d. per pkt. extra. Foreign, 6d. extra.

Ask your stationer for the "Diamond" packet.

SPECIAL TURKS ISLANDS JUBILEES complete set, used or unused, 5/6.

O. NERUSH (Dept. A), 68, TURNPIKE LANE, HORNSEY, LONDON, N.8.



THE 'SHIP' PACKET

This marvellous packet is offered under cost as an advertisement, **45 different stamps each with a ship on it.** A regular armada. **GABOON,** New Issue **SENEGAL** (Canoe), wonderful flotilla of caravels from **DENMARK** (complete set), **NEW CALEDONIA, UKRAINE, COSTA RICA,** a fleet of **7 CHINESE** junks usually sold at 10d., **TRINIDAD & TOBAGO, MAURITIUS, KENYA-TANGANYIKA, NEWFOUNDLAND, U.S.A., B. GUIANA,** set of **S. AFRICA, GREECE, POLAND, INDO-CHINA, FRENCH OCEANIA, WALLIS & FUTUNA ISLANDS.** etc. Price **4½d.**, postage **1½d.** (abroad 3d. extra). Purchasers of this packet asking for approvals receive **FREE** set of **3 SPAIN** (Columbus, each with his ship on it). Senders of addresses of stamp collectors receive **FREE** set of **6 VENEZUELA or 6 PERSIA, 100 BRITISH COLONIALS 1/-, 20 AIRPOST 6d., 6 TRIANGULARS 6d., 50 PERSIA 4/-, 2 ASTRID** (mourning stamps) **2½d., VOLUMES OF B.O.P. CHEAP.**





H. C. WATKINS (M. Dept.), Granville Road, BARNET

NEW ZEALAND JUBILEE PACKET FREE!

This **Marvellous** Packet contains a **Large** and **SCARCE NEW ZEALAND JUBILEE Pictorial;** Large **Paraguay AIR MAIL Pictorial;** Old **NATAL** (Q.V.); Fine set 8 **Canada;** Fr. Peace; China **Sun Yat Sen;** Old **Cape of Good Hope; Transvaal** (K.E.); U.S.A. **Chicago Exposition Pictorial; Large U.S.A. AIR MAIL; Large Dutch JUBILEE Pictorial,** etc. **ALL FREE** to those enclosing 1½d. postage and requesting our **BARGAIN** appros. of **Large** Pictorials,

THE PUKKA STAMP CO., 27, Normandy Avenue, BARNET.

The NEW "TRANSPORT" Packet

Contains a wonderful assortment of 44 foreign and colonial stamps including the following, which depict various means of transportation, **Tunis** (water carrier), **Senegal** (bridge and boats), **Mauritania** (crossing desert), **Mid. Congo** (train and bridge), **Sth. Africa** (ship), **Germany** (aeroplane), **Austria** (horseman), **Indo China** (boat), **Mozambique** (aeroplane), **Gaboon** (raft), **Greece** (bridge and liner), **St. Pierre and M.** (trawler), **Fr. Guinea** (native carriers), **Dutch Indies** (Steamboat), **Madagascar** (native transport), **Brazil** (aeroplane), **Belgium** (train), **Roumania** (aeroplane), **Newfoundland** (steamship), **Fr. Morocco** (camels). Price **6d.** Purchasers asking for approvals will receive **Ceylon** Silver Jubilee and Pictorials free.

BURDOCK & FLURY,
4, MARLBOROUGH ROAD, LONDON, S.W.19.

BARGAINS

MOROCCO. King Edward VIII. Complete sets (11), Mint at 1/3; Fine Used at 1/9. Postage extra.

CORONATION ISSUE.

COMPLETE SETS of 45 CROWN COLONIES, 25/-. No orders accepted at this price after 25th April, 1937.

ANY COLONY SUPPLIED SEPARATELY—send for lists of full particulars.

JUBILEES. 15 at 1/3; 20 at 2/3; 25 at 3/-.

T. R. HUGHES.
'Ibis Cottage,' Long Park, AMERSHAM, Bucks.

MINT CORONATION SETS — RELEASED MAY 12th

I am now booking orders for the following:

Antigua ... 7d.	Falkland Is. 6d.	Montserrat 7d.
Ascension 9d.	Fiji ... ... 9d.	N. Rhodesia 9d.
Bahamas... 6d.	Gibraltar 8d.	St. Helena... 9d.
Basutoland 9d.	Grenada ... 7d.	St. Lucia ... 7d.
Br. Guiana 9d.	Hong Kong 10d.	Somaliland 9d.
Cayman Is. 6d.	Kenya ... 8d.	Swaziland... 9d.
Cyprus ... 8d.	Malta... ... 6d.	Virgin Is. ... 7d.

Cash with order. Postage extra.

Remember the Jubilees—Order Now.

H. L. GOMM, 41, Upper Cranbrook Rd., Redland, Bristol, 6.

---

600 BRITISH COLONIALS on approval. Pick at ½d. each.—Sanders, 90, Newlands Avenue, Southampton.

Mint Coronation Commemoratives

Orders for the forthcoming CORONATION STAMPS are now being booked for delivery as soon as issued (about May 12th) as follows:

135 Stamps from 45 Crown Colonies (complete), £1/7/6
45 Stamps (1 from each Crown Colony) 5/-
CHEAP PACKET of 25 Various CORONATION Stamps 2/6

To ensure delivery, orders accompanied by remittance, must be received not later than 25th April.

All-Mint Brit. Empire Bargain Packets

28 different **Mint Stamps** from British Pacific Islands of Aitutaki, Cook, Fiji, Gilbert & Ellice, Nauru, Niue, New Hebrides, New Guinea, Papua, Rarotonga, Tonga, Samoa, Western Samoa, at **Bargain Price** of **2/6. 40 Different Mint Stamps** from **British Atlantic Islands** of Antigua, Ascension, Bahamas, Cayman, Dominica, Falklands, Grenada, Leeward, Montserrat, St. Helena, St. Lucia, St. Vincent, Turks & Caicos Is. At **Bargain Price of 3/3. 33 Different Mint Stamps** from **British African Countries** of Basutoland, Bechuanaland, B.E.A., Somaliland, Gambia, Morocco, Tangier, Seychelles, S. Leone, S. W. Africa, Soudan, Swaziland, Kenya-T-U., Zanzibar, Mauritius. **Bargain Price of 2/3. 40 Different Mint Stamps** from the British Asiatic Countries of Bahrain, Borneo, Brunei, China on H.K., Cyprus, Johor, Kedah, Kelantan, Kuwait, Negri-Sembilan, Pahang, Palestine, Perak, Sarawak, Selangor, Trand-Jordan and Trengganu, at **Bargain Price of 2/6. Four Senior Packets, 141 Different Mint** British Colonial Stamps, from the countries named. Price only **11/-. All Postage Extra. Cash with Order. Subject Unsold.**

EDWARD SANDELL, 10, Evelyn Grove, Southall, Mddx.

ONE THOUSAND STAMPS ON APPROVAL

From which you may select any 100 for 3/-.

This selection is not made up of the very commonest varieties, but contains stamps catalogued at 1/- each or more. (I do not sell less than 100.)

H. HARDY, "Hoyland," Potter Heigham, Norfolk.



Parcels of unsorted Stamps

GUARANTEED UNPICKED

Many good stamps are to be found and there is always the chance of a real "**Find**" being made.

Sold by weight only (*Note: Weight stamps average 4,000 to the pound—seldom more.*)

½ lb. (abt. 2,000 stamps) ... **2/7** Post Free
1 lb. (,, 4,000 ,,) ... **4/6** ,, ,,
2 lb. (,, 8,000 ,,) ... **7/6** ,, ,,

Abroad—add 6d. per ½ lb. Extra for postage

SAMPLE ¼ lb.—**1/6** Post Free. (*Abroad 1/10*)

PHILIP J. DYKE
35, Buckleigh Ave., Merton Park, S.W.20

BARNET PACKET FREE!

This fine packet contains BETTER CLASS Stamps from all parts of the World, and the great selection from which your packet will be picked is composed of stamps from old approval books, sets, etc., and includes attractive British Colonials, Air Mail Stamps, Flown Covers, Triangulars, South Americans, etc. This is a genuine clearance offer. Write now, enclosing 2d. in stamps for postage and packing, and request one of the now famous Green Approval Books.

G. KINGSMILL, NEW BARNET, HERTS.

FREE! EXHIBITION PACKET containing 50 different stamps including **Antwerp 1894** and **Brussels 1896 Exhibitions, Plebiscit,** set of **Austria** (all mint), Canada, etc., 250 mounts, duplicate book, and perforation gauge. Request approvals. Enclose 2d. postage. Special Bargains for Beginners—Stanley Gibbons Album, holds 3,000 stamps. Illustrated 7½d. 100 different stamps 5½d.

A. R. Dickie (Dept. M), 23, Winscombe Cres., Ealing, W.5

---

25 DIFFERENT FRENCH COLONIALS FREE. Request approvals. Winter, 89, Cobham Road, Seven Kings.

ALL BRITISH COLONIAL APPROVALS

Fine BRITISH COLONIAL sets of **SEYCHELLES** and **TURKS & CAICOS ISLANDS FREE** to all Collectors sending 1½d. stamp and requesting a selection of **BRITISH COLONIAL STAMPS** on approval. **ALL BRITISH COLONIAL APPROVALS** contain new and recent issues of Kings' Heads, Pictorials, Jubilees. (No stamps sent Abroad.)

C. H. SHAW (Dept. M.4), 95, CHRISTCHURCH AVENUE, KENTON, HARROW.

For other stamp advertisements see pages 244 and 246



ENGINEERING STAMPS

ENGINEERING designs on stamps have a special interest for Meccano boys. No matter what branch of engineering they favour, our readers will find hosts of stamps suitable for inclusion in collections formed to illustrate it.



The German Airship "Graf Zeppelin," as shown on the U.S. issue of April 1930.

Railway engineering is a typical example. There are designs available to demonstrate every phase of the development of the locomotive, from Stephenson's *"Rocket"* to modern Diesel-engined streamlined rail coaches. The *"Rocket"* itself has not been illustrated on a stamp, but a representative of its type is to be seen on the 6 pf. value of Germany's Railway Centenary series, issued on 10th July, 1935. There were three other extremely fine designs in this series, the 25 pf. and 40 pf. values showing streamlined articulated Diesel-engined railcar units as used on the Berlin-Hamburg and Berlin-Hanover runs respectively, and the 12 pf. showing a streamlined steam locomotive. Altogether there are well over 100 first-class railway designs on stamps and any reader who sets out to make a complete collection will find it a most absorbing task.

Ships and shipping is another engineering subject of great possibilities, and developments from early days to modern times can be excellently portrayed.

Egypt's International Navigation Congress issue of 1926 provides an interesting picture of an ancient Egyptian slave galley, taken from a picture on a piece of statuary found in the Temple of Deir-el Bahari. An early Viking galley is depicted on the 5 a. value of Iceland's Parliament Commemorative series of 1930, and a Carthaginian galley is shown on the Tunis 1 F. stamp of 1906.

Modern ships are shown on several stamps. For example, the 1 f. 75 Belgian anti-tuberculosis issue of 1929 gives a very fine picture of Antwerp Harbour crowded with shipping. France issued a special stamp on 23rd April, 1935 to celebrate the maiden voyage of the *"Normandie."* One of the most striking of all shipping stamps is the 1½d. value of the Falkland Islands Centenary issue of 1933, however. This is a really beautiful seascape with a whale-catcher as its central feature.



A typical Egyptian locomotive shown in Egypt's Railway Congress issue of 1933.



The Wright Brothers' aeroplane on the U.S. issue of 1928.

Naval vessels also figure largely on stamps, one of the best pictures being of the modern cruiser *"Averoff"* on the 3 dr. value of Greece's 1927 issue. The 6d. value of Jamaica's 1921-9 issue shows a view of naval ships of the British West Indian fleet in harbour at Port Royal in 1853. Ships of Nelson's time are shown in action on the 4 dr. value of Greece's 1927 series commemorating the centenary of the Battle of Navarino. Italy, Turkey, Japan, Colombia, and Uruguay are other countries that have issued stamps bearing pictures of naval vessels.



A pithead design from the Saar Valley issue in 1921.

Aviation is the outstanding engineering subject of the up-to-date stamp album. There are literally hundreds of stamps available for an aviation collection, and man's gradual attainment of mastery of the air can be illustrated almost without omitting one single chapter of the story. These stamps show balloons, airships, seaplanes and aeroplanes in all phases of development. To begin with there is the mythological flight of Icarus and Daedalus depicted on the Greek air mail series of 1935, and Leonardo da Vinci's man-power machine, shown on the 50c. and 7 L. 70 values of an Italian commemorative issued in 1932. The first machine of the Wright Brothers is shown on a U.S. commemorative stamp issued on 13th December 1928, and the *"Gee Bee"* racing machine is illustrated in a Latvian issue of 1933. The most recent aircraft shown are the Cierva Autogiro, seen on Spain's 2p. of 1935, and the Dornier Do.X., shown on the 13m. and 15m. values of Egypt's Aviation Congress series of 1933.



Quebec Bridge, as depicted in Canada's 1928-9 issue.

Charlière's balloon is shown on Latvia's 15s. stamp of 1932 and, at the extreme of modern development, we have Professor Picard's stratosphere balloon on the Belgian series issued in November 1932 to commemorate this great ascent.

The airship built by Santos Dumont in 1897 is shown on the 200 reis air stamp issued by Brazil in 1929. This ship had a capacity of 6,354 cu. ft., an amazing contrast to the *"Graf Zeppelin,"* so frequently encountered on stamps, which has a total capacity of 3¾ million cubic feet!

Bridge building is another important engineering topic that is excellently covered in the stamp album. Typical subjects that come to mind, illustrating different phases of development, are the 1 fr. value of the current Cameroon's issue, showing a primitive native-built suspension bridge slung across a forest stream, and the Sydney Harbour Bridge illustrated on Australia's commemorative issue of 1932. Quebec Bridge is shown on Canada's 12c. issue of 1928, and the beautiful Niagara Bridge shown on the 5c. of the U.S. 1901 issue commemorates the Pan-American Exhibition at Buffalo.



This view of a whale catcher is from the Falkland Islands Centenary issue of 1933.

There is not space here to list even briefly all the other engineering subjects that may be covered, but we shall be very pleased to give assistance and advice to any reader who contemplates forming collections of stamps illustrating such topics.

CORONATION STAMPS

(TO BE ISSUED IN MAY)

PREPAID Orders Now Being Booked

Complete Set of 135 stamps for the Crown Colonies **27/6** *Post free.*

Representative Set of 45 stamps 5'-
(One from each Colony). *Post extra*

INDIVIDUAL SETS—POSTAGE EXTRA

Aden 1'-, Antigua 8d., Ascension 9d., Bahamas 8d., Barbados 8d., Basutoland 9d., Bechuanaland 9d., Bermuda 8d., Br. Guiana 9d., Br. Honduras 9d., Br. Solomon 8d., Br. Somaliland 10d., Cayman 6d., Ceylon 10d., Cyprus 10d., Dominica 8d., Falkland 6d., Fiji 8d., Gambia 9d., Gibraltar 9d., Gilbert and Ellice 8d., Gold Coast 9d., Grenada 8d., Hong Kong 10d., Jamaica 8d., Kenya 10d., Leeward 8d., Malta 7d., Mauritius 10d., Montserrat 8d., Newfoundland 9d., Nigeria 9d., Nth. Rhodesia 10d., Nyasaland 6d., St. Helena 9d., St. Kitts 8d., St. Lucia 8d., St. Vincent 8d., Seychelles 10d., Sierra Leone 9d., Straits Settlements 10d., Swaziland 9d., Trinidad 9d., Turks and Caicos 9d., Virgin Is. 8d.

CORONATION ALBUM to hold all Coronation Stamps in preparation. **6/-** *Post free.*

Orders also being booked for Coronation Stamps from the Dominions, etc. Details not yet available.

STANLEY GIBBONS LTD.
DEPT. S.15, 391, STRAND, LONDON, W.C.2

ADEN CALLING!



Aden issues her new Arab Dhow set to-day. Send for the new short set of three values, **6d.** per set, postage 1½d. Members of the Investors' Club will receive theirs in this month's packet.

Fine Canada Coronation Issue 1937 will be sent FREE to all readers sending for my complete Price List of Coronation sets at prices from 6d. Please enclose 1½d. stamp.

Coronation sets posted from any or every Colony direct to your own home. **Complete sets, 50'-** (135 stamps).

No Approvals will be sent unless asked for.

HAVE YOU GOT A BIRTHDAY ON THE WAY?

Coronation Albums from **3'6** upwards.

A FEW CORONATION SET PRICES:

NAURU, 1½d., 2d., 2½d., 1/- ... ... mint 1/9, posted to you 2/-
NEW GUINEA, 2d., 3d., 5d., 1/- ... ... mint 2/2, posted to you 2/6
NIUE, 1d., 2½d., 6d. ... ... mint 1/-, posted to you 1/3

Listen in to my Stamp News from Radio Normandy, Tuesdays and Thursdays, 5-45 p.m.

ARCHIBALD F. McQUARRIE
PIONEER OF FIRST DAY COVERS
161a, STRAND, LONDON, W.C.2
'Phone: TEMPLE BAR 7409

THE MURDER PACKET FREE

This unique packet contains stamps bearing the heads of **Murdered persons only. RUSSIA** (Czar), murdered in a cellar. **ITALY**, Romulus and Remus (one killed the other); Cæsar (stabbed). **JUGO-SLAVIA**, special mourning stamp for King Alexander (who was shot). **4 CHINA**, Martyrs issue—Teng-Keng and his three compatriots (all were assassinated). **GREECE**, Rigas Feros (poet, killed by the Turks). **U.S.A.**, President Lincoln (shot in a theatre). Absolutely **FREE.** All you have to do is to send 1½d. postage and ask for approvals. Senders of collectors' addresses receive 6 Persia or 6 Venezuela free. 100 British Cols., 1/–; 20 Airpost, 6d.; 6 Triangular, 6d.; 20 Brazil, 8d.; 1,000 different, 3/11, 10 newly issued Pictorials, 6d. **H. C. WATKINS (M. Dept.), GRANVILLE ROAD, BARNET.**

SEND FOR OUR
"ZOOLOGICAL" PACKET

Containing a good selection of 45 Foreign and British Colonial Stamps, including the following pictorials: **Kenya** (Cranes), **South Africa** (Springbok), **Tchad** (Panther), **Turkey** (Wolf), **Poland** (Eagle), **Madagascar** (Zebus), **Cameroons** (Cattle), **Australia** (Sheep), **Hungary** (Turul) also (Eagle), **Fr. Indo China** (Ox), **Barbados** (Sea-Horses), **Finland** (Lion), **Epirus** (Eagle), **W. Australia** (Swan), **New Zealand** (Kiwi) also (Fantail), **Mauritania** (Oxen) **Fed. Malay States** (Tiger), **Sweden** (Lion). **Price 6d.** Colonial and foreign customers may send unused stamps equal to this value. Ask for approval sheets and receive **Morocco Agencies K.E. VIII and Andorra** pictorials **Free.**

BRETT & CO.,
201, Uxbridge Road, West Ealing, London, W.13.

"VATICAN CITY" PACKET FREE

There is a Beautiful set of 5 Handsome Vatican City Stamps in this grand free packet of 35 different. Amongst other fine stamps there are 5 Italian Commemoratives, including the Holy Year Stamp, Pictorials from Turkey, Guatemala, etc., several fine old Spanish issues and a 5d. stamp of King Edward VII all FREE to applicants for approvals enclosing 2d. postage. Write at once.

R. WILKINSON, 18, ST. PETER'S ROAD, CROYDON.

LABUAN 1902

FREE 10 Values used. As sold at 4/-. Particulars to approval applicants.

J. A. L. FRANKS, 44, Stapleton Hall Road, London, N.4.

500 PACKETS OF STAMPS FREE. Send 1½d. postage for copy of "Popular Stamp Collecting." 11 (M.M.), Southdown Road, London, S.W.20.

IMPROVED
THE "MYSTIC" PACKET

1000 UNSORTED UNUSUAL UNKNOWN 1'6

(Over 200 diff. guaranteed.)

Stamps on paper, etc. Just as received from Convents, Missions, Banks, etc. Guaranteed unpicked. Chance of a **FIND** in every lot. Send to-day for your treasure hunt to-morrow. 3 for **4/3**, 6 for **8/-**. **Abroad 1/9** pkt. **FREE!** 25 Br. Cols. including new issues to approval applicants. Enclose postage. Overseas 3d. Dealers supplied. Also **FREE EXCHANGE.**

ASTLEY & CO.
(M.1), LOWHILL, WOLVERHAMPTON.

CORONATION STAMPS

To be issued May 12th, 1937.

Set of 135 stamps ... ... **£1 7s. 6d.**
Representative set of 45 (one stamp from each of the 45 Colonies) ... ... **4s. 6d.**
Postage extra. Cash with order.
Full list free on application. Order early, remember the Jubilee rush.

ERRINGTON & MARTIN.
South Hackney, London, E.9. Estab. 1880.

12 Unused or 50 Used stamps free to applicants for approvals from ½d. enclosing postage. Gyton, Debden Road, Saffron Walden.

LABUAN FREE

This amazing **FREE** lot of old and new BRITISH COLONIAL stamps includes a fine and very scarce issue from **LABUAN**, printed in two colours and showing Royal Crown, together with other scarce and high value Colonials such as **JAMAICA** 1/- Victorian Judicial stamp; unusual **CANADA** and **GRENADA**; a **CEYLON** 50c. bi-coloured and an 1883 FEE stamp from **TRINIDAD.** In addition, we are including obsolete and short sets from **TRANSVAAL** (K. Edward); **NEW ZEALAND** (famous Admiral issue); **CEYLON** (K.G.); **JAMAICA** (1927/9 King); **S. AFRICA** (early Georgians); **AUSTRALIA** (C.A.); an old 1897 stamp of **NEW SOUTH WALES** showing the 'fleur de lis' and King Edward issues from **CAPE OF GOOD HOPE** and **NATAL.** All good quality BRITISH COLONIAL stamps and all **FREE** to genuine applicants for a selection of stamps on approval who enclose 2d. stamps to cover post and package. As a **SPECIAL ITEM** we offer **CHINESE** stamps at 25—6d.; 50—1/3; and 100—10/-, all different, postage extra.

WINDSOR STAMP CO.
(Dept. M), 59, LEE ROAD, BLACKHEATH, S.E.3.

50 DIFFERENT STAMPS. INCLUDING
HOLLAND 1936 TRIANGULAR AND JUBILEES FREE!!

To Genuine Applicants for my PICTORIAL APPROVALS who enclose 1½d. postage. *SEND TO-DAY* to Dept. M.

L. MACKEY, 9, Southfield Road, HINCKLEY, LEICS.

FREE STAMP OUTFIT free to genuine approval applicants. Large stock Mint Colonials, foreign and Jubilees. P. R. Lincoln, 60, High Road, Potters Bar.

SETS

4	Great Britain, Jubilee	6d.
4	Perak, New Issue	4d.
12	Italy, Foundation of Rome	6d.
4	Italy, Aeronautical	6d.
10	Hungary, Famous Men	6d.

KING EDWARD VIII

The set of 4 values King Edward G.B. overprinted for use in Morocco, unused, sent free to all genuine applicants for approvals enclosing 2d. postage.

PACKETS

50	diff.	British Colonials	6d.
100	,,	,, ...	1/-
100	,,	French Colonials	1/6
500	,,	Various	1/6
1,000	,,	,, ...	3/9

Postage Extra

R. D. HARRISON - ROYDON - WARE

135 Coronation Stamps ... 26/6

For other stamp advertisements see pages 242 and 246



Stamp Gossip

and Notes on New Issues



Coronation Stamps

By courtesy of the High Commissioner for New Zealand we are enabled to give an advance reproduction of the design to be used for New Zealand's Coronation commemorative stamps.

The issue will comprise three values and will be on sale in New Zealand from the 12th May to 31st December, 1937. The



stamps will be the same size as the New Zealand King George Silver Jubilee stamps, but will be printed in single colours, as follows: 1d., bright carmine; 2½d., dark blue; 6d., vermilion.

The central feature of the design will be portraits of Their Majesties the King and Queen, and the side borders and upper ornament will be of Maori design. Readers of the article "*Maori Art in Stamp Designs*" that appeared in the March "*M.M.*" will be interested to see that the side panels of the new stamps are combinations of the symbols to which attention was then drawn.

The value tablets are placed in the top corners, and the top border contains the wording "New Zealand" with the date of the Coronation—12th May, 1937—underneath. At the foot of the design, in the centre, is a reproduction of the shield bearing the New Zealand Coat of Arms, and the words "Postage and Revenue" occupy the bottom panel.

The stamps will be printed on paper watermarked with the N.Z.-Star device, and the total issue will be 60 million of the 1d. value, two million of the 2½d., and three million of the 6d.

The printing is being carried out by Messrs. Bradbury, Wilkinson and Company, who prepared the design to the instructions of the New Zealand Government, but the Government Printing Office in Wellington will over-print supplies for the Cook Islands and Niue.

New Stamp Booklets

The latest extension of Post Office services has been the introduction of a "sixpence-in-the-slot" machine delivering small stamp booklets containing four 1½d. stamps. The new machine made its appearance at a number of London post offices on the 22nd January, and has already proved popular.

A Curious Endorsement

An air mail letter from the Mount Everest Expedition of last year, received by a Boreham Wood reader of "*Stamp Collecting*," bears what is certainly one of the most curious official endorsements ever placed on the envelope of a letter.

The endorsement reads "Suffered detention at Gangtok Post Office owing to the Postmaster's failure to affix postage stamps and to forward them in time. The Postmaster has been sent to jail for this offence." Above the endorsement is the seal of the Political Officer at Sikkim.

Greek Definitive Issue

The recently issued Greek definitive issues bearing the portrait of King George II possess several points of interest to British stamp collectors, for one cannot help remarking that the designer of the new Greek stamps has worked on very similar lines to those of the designer of our King Edward VIII stamps. He has added borders and centred the crown, but there is nevertheless a remarkable similarity that enables us to visualise very clearly what the King Edward stamp might have looked like had certain concessions to convention been made.

There are four values in the new Greek series, values 1, 3, 8 and 100 Lepta, each using the same design. This is the first appearance of King George's portrait on Greece's stamps.



Striking Parcel Post Stamp

The Portuguese parcel post stamp illustrated on this page is a striking example of how modern art can strip a design of all but essentials and still present a thing of beauty. On this stamp we have only the name of the country, a descriptive label and a figure of value, and in the centre a representation of a postal parcel. The stamp as a whole is one of the most striking of recent times, and is an excellent example of a simple design illustrating the purpose of the stamp.



U.S. Heroes Stamps

Two 3c. stamps in this series, one each for the Army and Navy, were placed on sale on 18th February, the Army stamp showing portraits of William T. Sherman, Ulysses Grant and Philip Sheridan, three of the most famous Generals of the Northern Army in the Civil War.

The Navy stamp bears portraits of Admirals David Farragut and David Dixon Porter in ovals at the sides of the stamp.

Colombian Sports Issues

Football enthusiasts among our readers will be delighted with the 3c. stamp of Colombia's recently issued National Olympic Games issue. As our illustration shows, the stamp provides an excellent football action picture. There are two other stamps in the series, 10c. showing a sprinter breaking the tape and $1, a pacer.



Simultaneously Colombia has issued in its permanent series two new stamps of 1c. and 12c. values, showing a portrait of Bolivar and a view of the Tequendama Waterfall respectively.

A series commemorating the National Exhibition at Barranquilla also has been issued. There are three stamps in this series, with designs as follows: 5c., exhibition building; 15c., Barranquilla pavilion; 50c., monument of the flag.

Aden's First Stamps

As from 1st April, Aden will be administered as a separate British Colony, and will issue its own stamps immediately.

There are 12 denominations of stamps in the first issue, ranging from ½ a. to 10 r., and each bears the same design, a representation of an Aden-built dhow flanked by an ornamental border.

The name of the Colony appears at the head of the stamp and the value tablets, in English and Arabic characters, are at the foot.

This new permanent issue is to be placed on sale on 1st April, but during the period 12th May to 31st December the 1 a., 2½ a., and 3½ a. values will be superseded by Coronation Commemorative stamps.

Commemorative Stamp Purchases

A very striking illustration of the extent to which stamp collectors' interest affects stamp sales is obtained from a comparison of the sales of the recent Chambers of Commerce Commemorative issue in New Zealand with normal sales.

This commemorative series was sold out in a very few days and the sales of the higher values were as follows: 2½d., 357,696; 4d., 364,896; 6d., 441,696. The normal monthly sale of these three values is: 2½d., 30,000; 4d., 160,000; 6d., 180,000.

We thank Stanley Gibbons Ltd. for their courtesy in loaning the stamps from which the illustrations on this page have been made.

(Continued from page 244)

HAVE YOU ORDERED YOUR CORONATION STAMPS?

Complete mint set of 135 stamps, from 45 Crown Colonies, 24/6 post free.
5/- Deposit will secure and balance by April 25th, 1937.
Or Representative Set of 45 mint stamps, one from each Colony, 5/- post free.
2/- Deposit and balance by April 25th, 1937.
All mint Dominion Coronation sets reserved if desired. Price in proportion to Crown Colonies set and exact cost advised when Official Information is available. Used sets and covers posted direct to you from 6d. Full price lists gratis and post free on application. Would you like to see a selection of Coronation Stamps, mint and used on approval? If so, send me your name and address and a selection will be sent as soon as possible after these are issued on May 12th. Write now as all requests will be dealt with in strict rotation.

K. HUMPHRIES.
Dept. M, East Wittering, Chichester, Sussex.

SET of 5 Abyssinia Red Cross, 2/-. Ronald Lee, 27, Meyrick Road, Battersea, S.W.11.

FREE 25 stamps, apply for approvals, 1½d. postage. Irving, Hill Terrace, Wigton.

100 Different Stamps Free to applicants for ½d. approvals. Cox, 14, Broadmead Av., Worcester Park.

FREE 4/- PERU to every sixth genuine applicant requesting approvals. N. Jones, 32, Claremount Rd., Wallasey.

Beautiful Pictorials, from Belgium (Prince Baudouin), Bermuda, Madagascar, Costa Rica, and N. Zealand (Commerce issue). Free to all Bargain Approval applicants (Postage 1½d.) The Hillside Stamp Co., 7, Hillside Gardens, Barnet.

CHEAP APPROVALS
My beautiful Approval Selections are ideal for filling those vacant spaces. Pictorials, Colonials, and hard to get items. Selections from 4 a 1d. Free Gift Bi-coloured Persia all applicants.
A. V. TAPP, 26, WINDSOR ROAD, BRISTOL, 6.

SILVER JUBILEE FREE
A mint Silver Jubilee of St. Lucia, together with an Australian, Free to all approval applicants. Postage 1½d.

KING EDWARD VIII
Complete set of 11 stamps of Morocco Agencies, Mint. Price 1/6, postage extra.
AGEC, Dept. M, 12, Wellesley Rd., Clacton-on-Sea, Essex

CORONATION STAMPS
CROWN COLONIES
Complete set of 135 Stamps ... ... **25/6.** post free.
Representative set of 45 Stamps ... **5/-.** post extra. (one from each colony).
Place your order **at once.** Cash with order. Orders will be executed in strict rotation; so book early.
A. LUCAS, 60, Park Street, BRISTOL.

FOUR SILVER JUBILEE FREE
to all buyers of the "Morvi" packet who
ASK TO SEE MY APPROVAL SHEETS.
The packet contains **Morvi** (Indian Rajah), Latakia, Mozambique, Iran (Lion), **Estonia,** New Issues, French and British Colonials, **Uruguay,** many others, post free 3d. **New Approval Sheets** ready. Fine variety. B. Colonial and Foreign Pictorials, etc. Write for a selection to-day. Duplicates exchanged. Exchange wanted with Colonies.
F. G. ROWE, 69, EDGEHILL ROAD, BOURNEMOUTH.

Coronation Stamps

9 different	1/-	15 different	1/9
24 different	2/9	36 different	4/3
45 different	5/-	135 different	27/6

Order now to prevent disappointment.
C. A. MASTERS,
BROADSTONE, DORSET.

MECCANO WRITING PADS
These Writing Pads are just the thing to use when writing to your friends or to the Editor.
They are supplied in two sizes, each consisting of 50 printed sheets of tinted bank paper with cover. Prices—Large, 1/- each (post free); Small, 6d. each (post free).
ENVELOPES
Special envelopes, attractively printed and matching the writing paper in colour, are also available. These are suitable for both the large and the small sheets of writing paper.
Price, per packet of 50, 8d. post free.
Meccano Ltd., Binns Road, Liverpool 13

Safety First Postmarks

An interesting development in "Safety First" propaganda has recently been made in Germany, New Zealand, and Switzerland. In each of these countries postmark slogans are being used to urge pedestrians to observe road traffic regulations and to exercise care in their use of the roads.

On page 245 we illustrate one of the German slogans in use at the Berlin G.P.O. It reads "Fussgänger! Verkehrszeichen gelten auch für dich," which means "Pedestrians! Traffic signs apply to you also." The first of the New Zealand slogans that has come to our notice is of a more laconic type, but is equally effective. It has been used on correspondence franked at the Auckland office and reads "More Motors: Still More Care." A Swiss specimen in use at Zurich, reads "Pedestrians: Observe the Traffic Regulations."

This is a form of propaganda that might well be adopted in Britain, where the toll of road accidents continues, in spite of the efforts of our road authorities. It need not be regarded as restricted to pedestrians, for it will appeal to cyclists, motorists and all road users. A striking slogan used as a postmark therefore will help to bring home to all of them the fact that they share in the responsibility of avoiding accidents.



Typical cigarette cards from a new series showing scenes from "The World of To-morrow." The three cards illustrated show a revolving house, a fog eliminator and a coal-oil distilling plant.

Gibbons Air Stamp Catalogue

The steady increase in the popularity of Air stamps, with Governments and collectors, has made it necessary for Stanley Gibbons Ltd. to produce a fifth edition of their Air Stamp Catalogue. The handy pocket size that has been so popular a feature of its predecessors has been retained in this edition but an improvement is the adoption of an attractive crimson cloth board binding that will make for greater durability.

Details of more than 300 new stamps are included in this new edition in addition to the many price revisions that have occurred since the last edition was published. These revisions are notably in the early issues, of course, but all types are affected and for this reason the new catalogue should be in the possession of every collector of air stamps.

It may be obtained from any stamp dealer, price 2/6, or from Stanley Gibbons Ltd., 391, Strand, W.C.2 for 2/9 post paid.

Engineering and Science on Cigarette Cards

The illustration on this page shows three cigarette cards of an interesting new issue by Stephen Mitchell and Son that will make a special appeal to "*M.M.*" readers. There are 50 cards in this issue and their subject is "*The World of To-morrow.*" Every card shows a recent development in science or engineering, or gives a fascinating glimpse of some possible wonder of the future.

The three cards illustrated picture a house that revolves with the Sun, a machine producing a ray that dissipates fog, and a coal-oil distilling plant respectively. Other cards show a gigantic dam built across the Strait of Gibraltar, a rocket space-ship, a city of the future and other remarkable if sometimes fantastic subjects. The pictures are excellently reproduced, and the descriptions and explanations on the backs of the cards make interesting reading.

The 1937 Model Railway Exhibition

The 1937 display of the Model Railway Club is being held this week in the Central Hall, Westminster. The Exhibition was opened on Tuesday, 30th March, and will remain open until Saturday, 3rd April. On 1st, 2nd and 3rd April the exhibits will be on view from 11 a.m. to 10 p.m.

The display is on a larger scale than in previous years, and includes a wide range of model locomotives, coaches, wagons, signals, permanent way and railway accessories of all kinds, together with working model layouts in all gauges. Free rides behind the larger locomotives are being given to visitors, and there also is a free cinema display. A special feature is an interesting display of work of members of the French Model Railway Club.

Refreshments are available and a welcome innovation is the use of the large annexe of the Central Hall as a lounge. The charges for admission is 1/3, children 6d.

Oils for Cyclists

We have received from the County Chemical Co. Ltd., specimens of the Nonclog cycle oils they make, and have given them all tests with excellent results. These oils are now made in three grades. One is the original Nonclog A, which continues to maintain its popularity; and the second is Nonclog B, a special oil of slightly higher viscosity. To these a special oil incorporating Acheson's Colloidal Graphite and known as Nonclog Graphited has been added. All three oils are sold in tins, Nonclog A and Nonclog B at 6d., and Nonclog Graphited at 9d. These tins can be supplied with a patent inverted spout as an alternative to the original cross-over spout.

Another product of the County Chemical Co. Ltd. that will be of interest to motorists is a new and simple type of spray gun that has recently been introduced to force "Chemico" Penetrating Lubricant between the leaves of springs. It is sold at the low price of 3/-.

Sheffield Model Railway Club

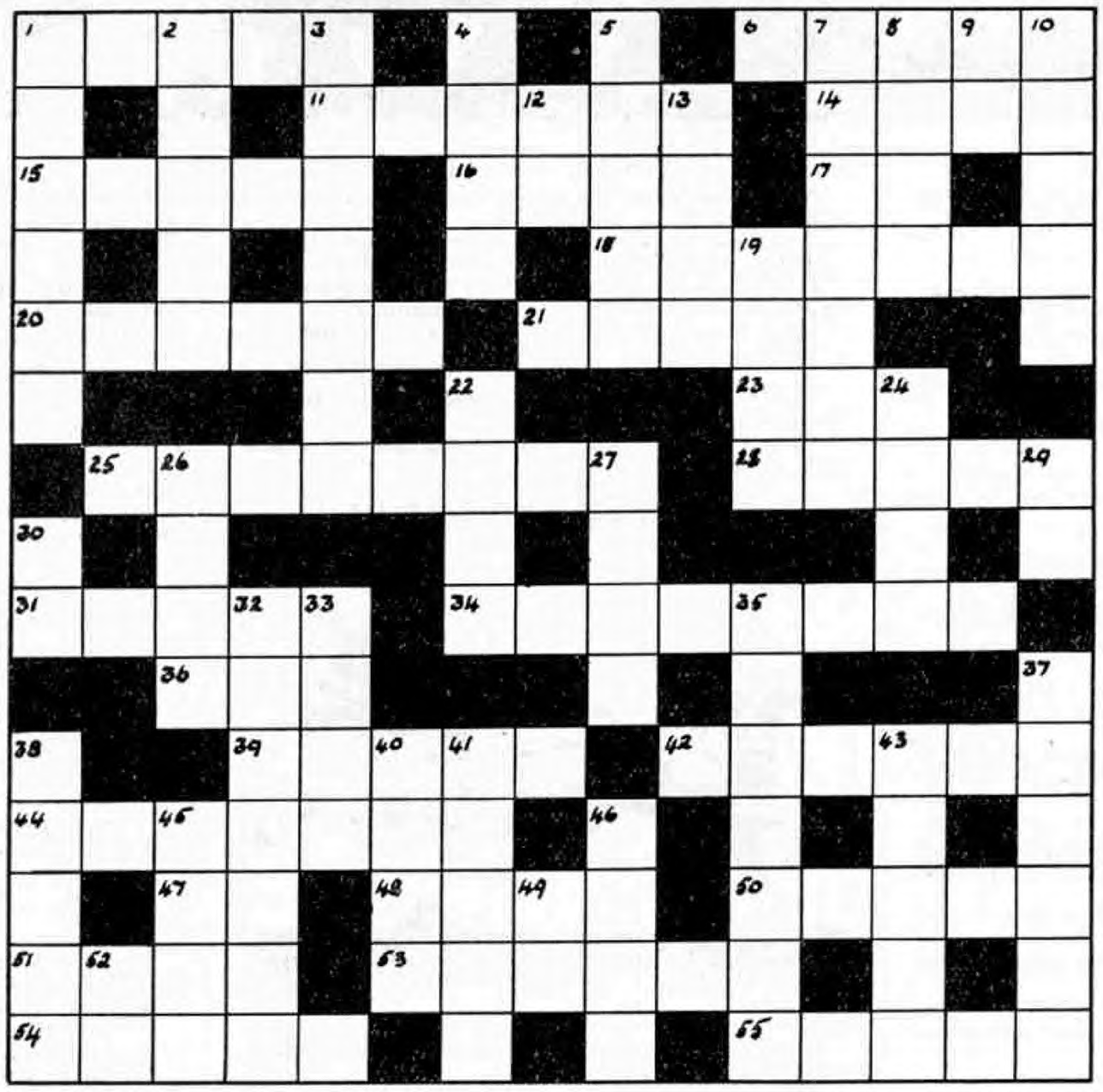
Model railway enthusiasts in Sheffield will be interested to know that a Model Railway Club has been formed there. Members carry out work on Gauge O miniature railways of all kinds, and Hornby Railway owners are given a special welcome. Meetings are held on Tuesdays, and the subscription is 2/6 a quarter. Further particulars can be obtained from the Secretary, Mr. A. Bearder, 124, Staniforth Road, Sheffield. 9.

A Streatham Scout Show

An Exhibition and demonstration of Scout work organised by the Streatham Boy Scouts Association will be held in the Lower Streatham Hall on 14th, 15th, 16th and 17th April, opening at 8 p.m. on the first three days and at 3 p.m. in the afternoon of Saturday, 17th April. The charge for admission is 3d.; cubs, scouts and guides in uniform will be admitted for 1d. A special feature of the Exhibition will be a remarkable scale model aerodrome, covering an area of about 70 sq. ft., on which there are models of over 50 aircraft. A special performance of excerpts from Scout Shows and a Rover Pantomime will be given at 8 p.m. on the Saturday.

Competition Corner

APRIL CROSSWORD PUZZLE



CLUES ACROSS

1. Broken
6. Quick
11. Speaker
14. Large piece of furniture
15. Not
16. Learning
17. Thus
18. Unaffected
20. Arranged
21. Fluids used by Doctors
23. Insect
25. Affects
28. Saying
31. Starves
34. Fish
36. Weight
39. Competitor
42. Detain
44. Hasten
47. Part of verb to be
48. Scorch
50. Powerless
51. A famous garden
53. Flavour
54. Silly
55. Dislikes

CLUES DOWN

1. Dismiss
2. Roamer
3. Stream
4. Bundle
5. Carried
7. Taken for granted
8. Needy
9. Whether
10. Delay
12. Forward
13. End
19. Musical instrument
22. Closes
24. Consumes
26. Corrode
27. Examine
29. Printer's measure
30. Belonging to
32. Tease
33. Cut
35. Polish
37. Narrates
38. Requested
40. Article of clothing
41. Tracts
43. Choose
45. Aid
46. Wiles
49. Like
52. Act

The "*M.M.*" crossword puzzles in the past have been exceptionally popular, principally, no doubt, because they are set for amusement rather than strenuous competitive effort. This month's puzzle will be found to follow the lines of those set in previous issues in that it is fair and interesting. The clues are all perfectly straightforward, and every word used can be found in Chambers' or any other standard dictionary.

Prizes of Meccano Products value 21/–, 15/–, 10/6 and 5/– respectively will be awarded in order of merit to the senders of the four correct solutions that are neatest or most novel in presentation. The prizes will be duplicated for the Overseas section, which is open to all readers living outside Great Britain, Ireland and the Channel Islands.

Entries should be addressed "April Crossword Puzzle, Meccano Magazine, Binns Road, Liverpool 13," and must be sent to reach this office not later than 30th April. Overseas closing date 31st July.

Summer Photo Contests

Each month throughout the coming spring and summer we shall offer prizes for the best photographs submitted. The prizes will be awarded to the best photographs irrespective of subject, size, make of camera, film or paper. The only restrictions will be that each print must bear a title and the exposure must have been made by the competitor. The finishing may have been professionally done.

Entries for each month's competition will be divided into two sections, A for readers aged 16 and over, B for those under 16; and prizes of Meccano products or Photographic Materials, as chosen by the winners, to the value of 21/– and 10/6 will be awarded in each section.

In addition to its title, each print must bear on its back the competitor's name, age and address. Unsuccessful entries will be returned if a stamped addressed cover is sent for the purpose. In the ordinary course prize-winning entries are retained, and it is a condition of entry that the Editor shall have the right to reproduce any entry without fee.

Entries sent this month must be addressed "April Photo Contest, Meccano Magazine, Binns Road, Liverpool 13," and must arrive not later than 30th April.

There will be separate sections for readers Overseas with prizes of the same values. Overseas entries for the April competition must arrive not later than 31st July.

Competition Closing Dates

HOME	
April Crossword Puzzle	30th April
April Photo Contest	30th April
OVERSEAS	
"Animalesques" Contest ...	30th April
Broken Resolutions Contest ...	30th April
January Drawing Contest ...	30th April
Price Codes	31st May
February Drawing Contest ...	31st May
Car "Faces" Voting Contest ...	30th June
March Drawing Contest ...	30th June
April Crossword Puzzle ...	31st July
April Photo Contest	31st July

Watch the Closing Dates

COMPETITION RESULTS

HOME

"Price Codes" Contest.—1. W. C. Hannan (Glasgow, E.1.). 2. L. W. Chitty (London, S.W.20). 3. R. Buxton (Blackpool). 4. E. Beven (Sheffield). Consolation Prizes: F. C. Bent (Disley); P. Brackett (London, S.W.17); W. K. Cocking (Redruth); T. W. Green (Mapperley); J. H. Kempley (Grays); D. R. Parker (Sale); L. J. Slater (Portsmouth); T. D. Tasker (Barnsley).

February Drawing Contest.—First Prizes: Section A, C. Bowles (Grimsby); Section B, C. P. Hay (Stranraer). Second Prizes: Section A, K. Dyson (Tadcaster); Section B, A. R. Jackson (Hull). Consolation Prizes: D. Auty (High Wycombe); D. Bain (Penicuik); D. Bailey (Birmingham, 21); L. F. Shelton (Bushey).

OVERSEAS

"Modern Inventions" Voting Contest.—The voting in this contest is the subject of comment on the Editor's Page this month and competitors who desire to check their entries against the final order of voting will find full details on that page.

The Prize awards are as follows: 1. J. C. Oleaga (Buenos Aires). 2. J. C. Carter (Capetown, S. Africa). 3. C. Keekok (Singapore, S.S.). 4. D. J. White (Christchurch, N.1, N.Z.). Consolation Prize: P. Odlin (Auckland, N.Z.).

"School Story" Contest.—1. T. S. Roberts (Vancouver). 2. R. Collinson (Capetown, S. Africa). 3. N. Edwards (Sydney, N.S.W.). 4. R. J. Allan (Victoria, B.C.).

November Drawing Contest.—First Prizes: Section A, A. N. A. Puntman (Arnhem, Holland); Section B, C. A. Astrom (Morko, Sweden). Second Prizes: Section A, M. Conly (Dune lin, N.Z.); Section B, R. J. Dickison (Dunedin, N.Z.).



STILL IN A CAGE

Prison Visitor: "How terrible to be caged up here all the time! What were you before you came here?"
Convict: "A lift attendant."

* * * *

Old James was visiting a friend in the Highlands. "Did you have much snow last winter?" he enquired.
"Not verra much," replied the Scot; "my neighbour had much more than I did."
"How could he?" queried the other. "He doesn't live more than a mile away."
"Weel, he's got a deal more land."

* * * *

Genial Motorist: "May I offer you a lift, sir?"
Absent-minded Professor: "No, thank you, I have no use for one. I live in a bungalow."

* * * *

The conjurer was producing eggs from a top hat. He addressed a boy in the front row.
"Your mother can't get eggs without hens, can she?" he asked.
"Oh yes," said the boy.
"How's that?" asked the conjurer.
"She keeps ducks," answered the boy.

* * * *

Jack: "I once lived on apples for three weeks."
John: "That's nothing. I've lived on earth for 50 years."

* * * *

Father was regarding his Income Tax demand and examining his pass-book when Uncle came in and saw his worried look.
"You should pay your taxes with a smile," said Uncle cheerfully.
"I wish I could," replied Father, "but unfortunately they insist on money."

* * * *

Circus Manager: "Who's making that screaming noise in that tent over there?"
Assistant: "Oh, it's the lion-tamer; he's seen a field mouse."

* * * *

Mother: "I've told you, Jack, to wait for your elders to stop speaking before you begin."
Jack: "I've tried that, Mummy; but they never do."

* * * *

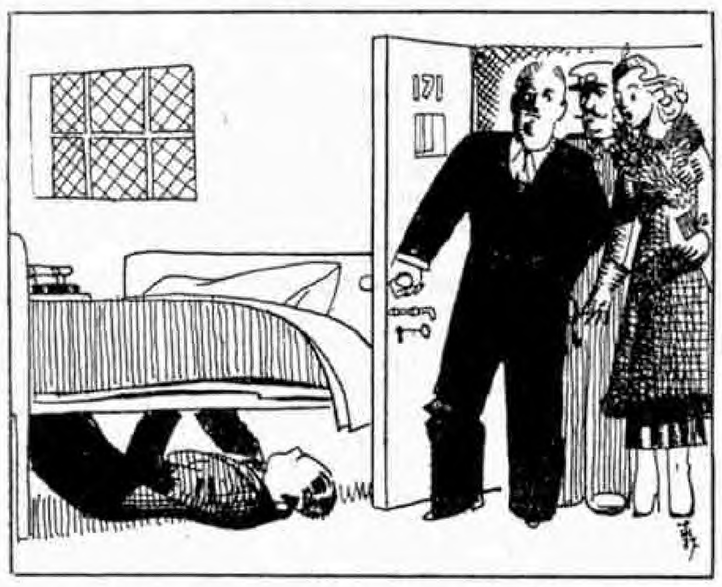
Tom: "Say, Bill, I had a whopper of a dream last night."
Bill: "Yes, what was it?"
Tom: "I dreamed that my watch was gone, and when I woke up it was going."

* * * *

Guide: "This castle has stood for 600 years. Not a stone has been touched, nothing altered, nothing replaced."
Visitor: "Um, they must have the same landlord as we have."

* * * *

FORCE OF HABIT



A visitor was being shown around the asylum. In one bedroom a man was seen lying on his back under the bed.
"This man," said the superintendant, "was once a chauffeur."
"But what on earth is he doing?" asked the visitor.
"He's examining the springs," was the reply.

KING'S ENGLISH

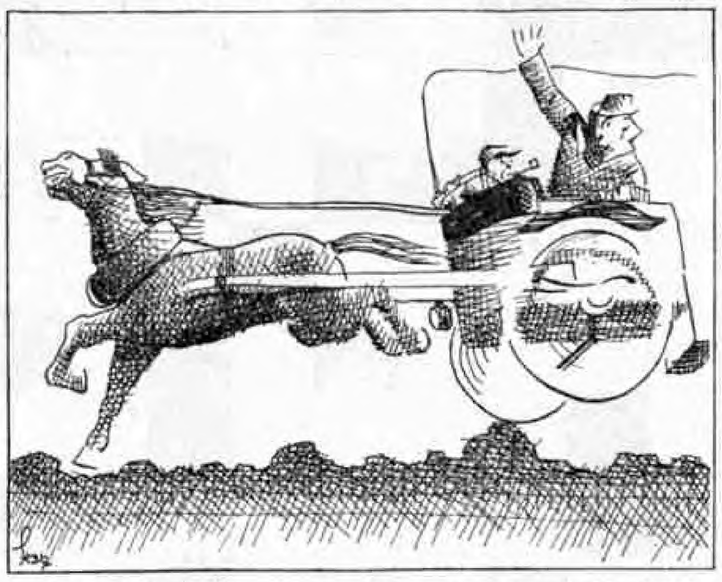
After knocking at the door of the house, the visitor was announced by a small boy.
"Are your father and mother in?" he asked.
"They was in," said the boy, "but now they is out."
"They was in, and now they is out'," repeated the visitor in disgust. "Where is your grammar?"
"Oh," exclaimed the boy, "she's away upstairs for a lay-down."

* * * *

Mother: "What are you doing in the pantry, Tommy?"
Tommy (virtuously): "Only fighting against temptation, mummy."

* * * *

SOMETHING FOR NOTHING



A man was being driven over a very rough Yorkshire road when the mare bolted.
"I'd give £5 to be out of this trap!" he exclaimed in alarm.
"Keep thi' brass, lad," replied the driver, "tha'll be out for nowt in a minute."

* * * *

"Mamma, I've just seen a man who makes horses."
"Are you sure?"
"Yes, he had one nearly finished when I saw him; he was just nailing on its back feet."

* * * *

Motorist: "I certainly was not speeding, although I may have been travelling at more than 30 miles an hour."
Magistrate: "I'll accept your explanation, and instead of fining you two pounds I'll make it forty shillings."

* * * *

Jack: "Isn't it wonderful that a man in England can talk to a man in Australia."
Tom: "That's nothing, I knew a man who played a cornet in Glasgow, and then came down to Plymouth and saw the Sound."

* * * *

"Did you read about the Scout who swallowed his teaspoon?"
"No; what happened to him?"
"Oh, he can't stir."

* * * *

"Rheumatism," said the doctor, "causes one to imagine that one's joints are very much larger than they actually are."
"I know," exclaimed Mrs. Housebody, "our butcher has it."

* * * *

Mother: "Tell me what you have been doing."
Johnny: "I have been doing this and that, here and there, now and then."

* * * *

Pilot (to lady inspecting his plane): "And this, madam, is the motor."
Lady: "But if it's fastened like that, how can it turn over?"

* * * *

Foreman: "You ain't one of them men what drops their tools and scoots as soon as knock-off blows, are you?"
Workman: "Not me. Why, I often have to wait five minutes after I puts me tools away before the whistle goes."

RIDICULOUS!

"Martha, did you wash the fish before you baked it?"
"Lor', mum, no! Wot's the use of washin' a fish wot's lived all its life in water?"

* * * *

"But why didn't you say in your reference that you were Scottish?"
"Well, sir, I didna like to boast."

* * * *

"Do the tablets ease your pains all right?"
"Yes, doctor. I took two last night 'arf an hour afore they started, an' I haven't had 'em since."

* * * *

Irate Tenant: "The rain's simply pouring through the roof. We shall be drowned!"
Unperturbed Landlord: "Well, what do you want me to do—call a lifeboat?"

* * * *

"What brought you to prison, my good man?"
"Competition, mum."
"Competition? I don't understand."
"Well, you see, mum, I made the same sort of half crowns as the Government, and they didn't like it."

* * * *

Speaker: "I am delighted to see this dense crowd here to-night."
Voice: "Don't be too pleased, guv'nor; we ain't all dense."

* * * *

Young Brown was watching young Jones admiringly in the swimming bath.
"Jolly good! You can swim like a fish," he said.
"Better, I reckon," said Jones. "I can swim on my back."

* * * *

Teacher had just told the class the meaning of the word metaphor, but she suspected that Jack was not listening.
"Give me a sentence containing the word 'metaphor,' Jack," she said.
"Coming to school this morning I met a four-legged horse," he replied.

* * * *

Magistrate: "You admit you drove over this man with a loaded lorry?"
Driver: "Yes, your Honour."
"And what have you to say in your defence?"
"I didn't know it was loaded."

* * * *

Baker: "Tommy, why have you eaten those cakes?"
Tommy: "Please, sir, you told me to put them where the flies wouldn't get them."

* * * *

Schoolmaster: "If Shakespeare were alive to-day, would he still be regarded as a remarkable man?"
Pupil: "I'd just think so. Why, he'd be 370 years old!"

* * * *

Dentist: "Have you seen any small boys ring my bell and run away, constable?"
Constable: "They weren't small boys—they were grown-ups."

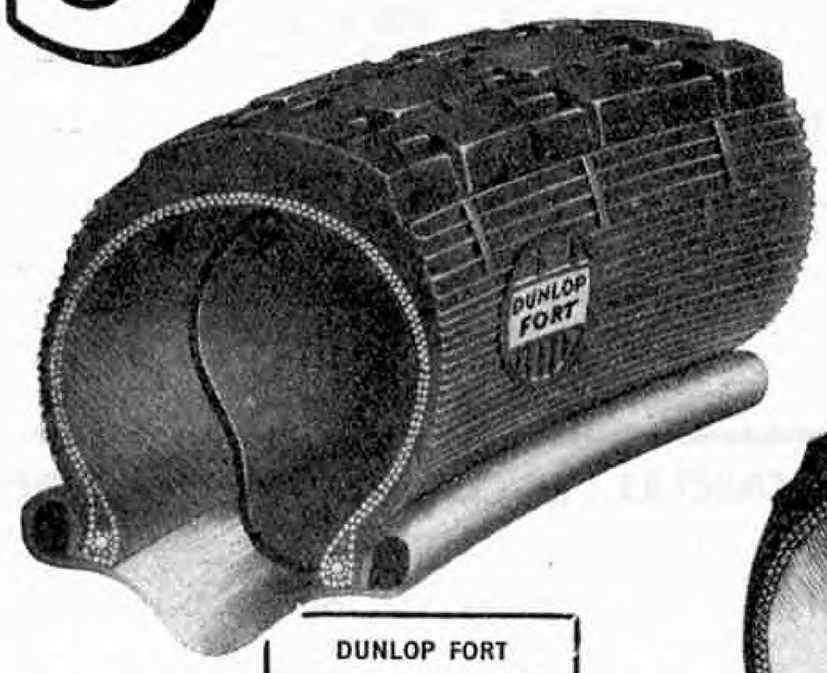
* * * *

NOT WITH INTENT

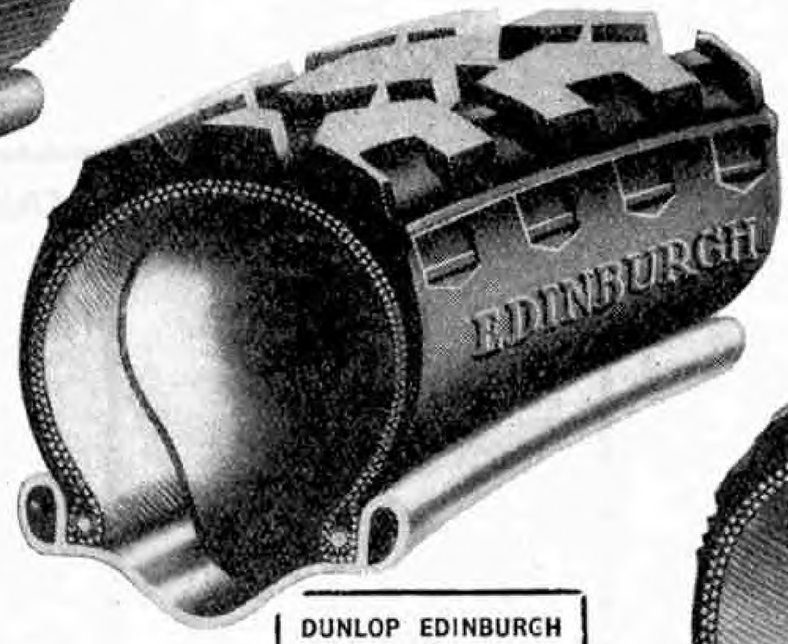


Farmer: "Gosh! You must be brave to come down with a parachute in a gale like this."
Stranger (grumpily): "I didn't come down with a parachute. I went up with a tent!"

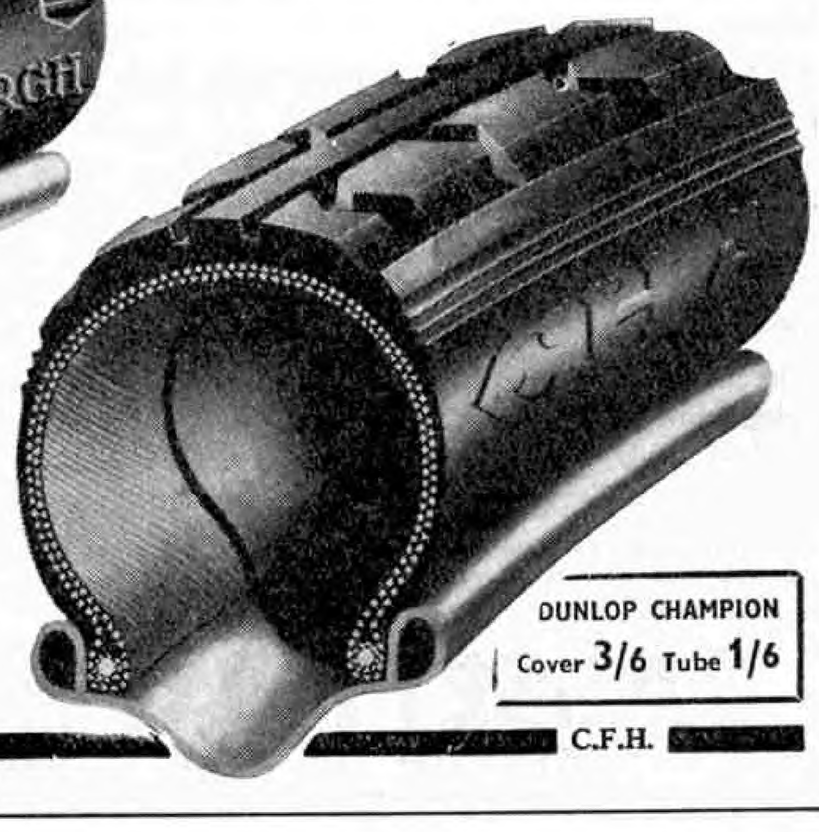
3 FAMOUS DUNLOP CYCLE TYRES



DUNLOP FORT
Cover 8/6 Tube 3/-



DUNLOP EDINBURGH
Cover 5/6 Tube 2/3



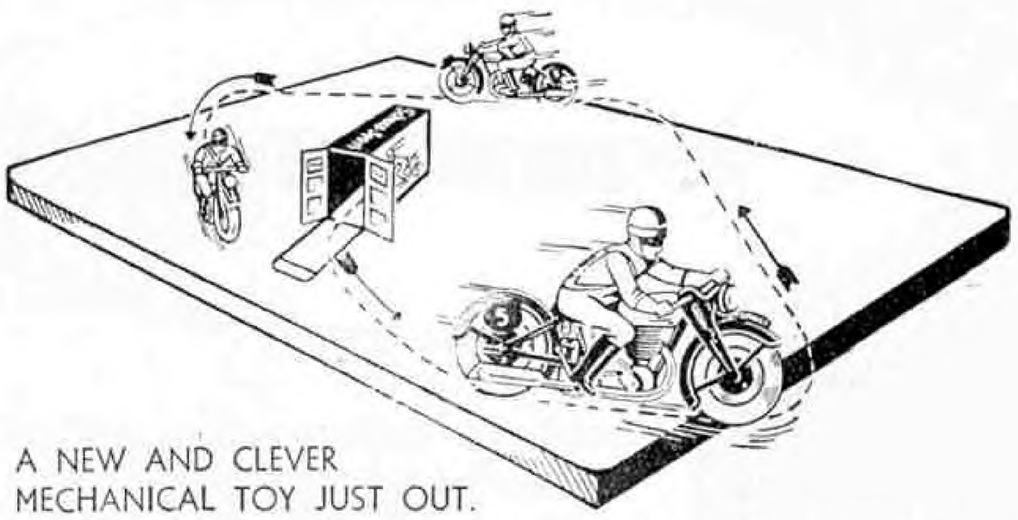
DUNLOP CHAMPION
Cover 3/6 Tube 1/6

★ Always select from the Dunlop range for utmost value

DUNLOP RUBBER CO. LTD., FORT DUNLOP, BIRMINGHAM. *Branches throughout the World*

C.F.H.

7H/306

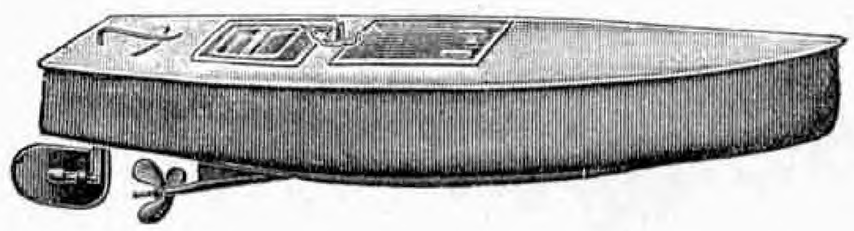


A NEW AND CLEVER MECHANICAL TOY JUST OUT.

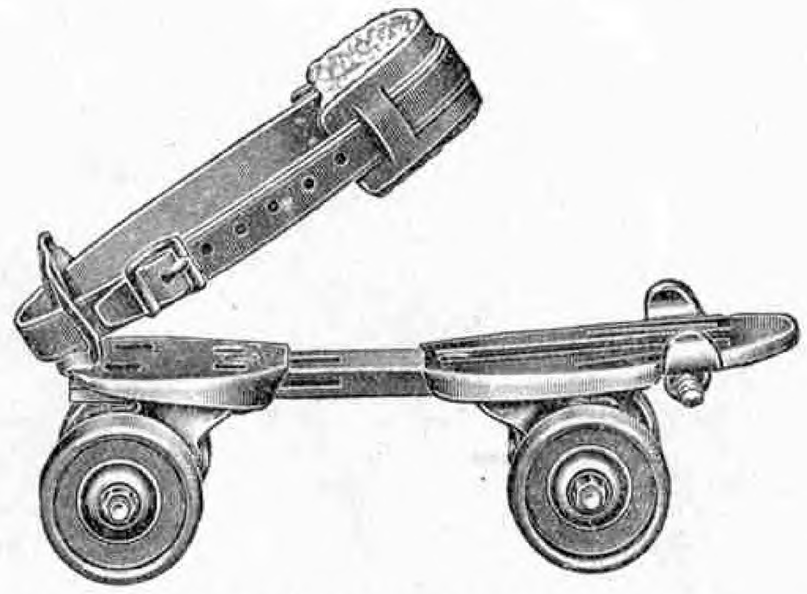
SCHUCO-SPORT MOTOR CYCLIST. Turns back from table edge in a most amazing way without falling off. With the box as a Garage **2′-**, post 3d. in U.K. (*Foreign.*)



Zulu Kraals and Warriors, Palm Trees, and scenic background. Eleven pieces, post free **5′-** in U.K.



RAVEN'S ELECTRIC SPEED BOAT. Driven by pocket lamp battery; you just switch on and she runs for hours. Including battery, post free **5′6** in U.K. (*Foreign.*)

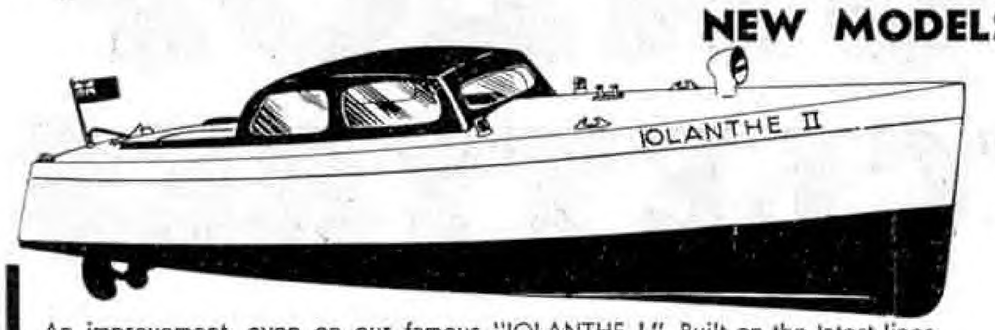


RAVEN'S STREAMLINED SKATES. Ball Bearings, Nickel plated, Rubber Shock Absorbers and Reinforced Girder Frame. Post free **9′6** in U.K. (*American.*)

RAVEN'S STORE, Victoria Circus, **SOUTHEND-ON-SEA**

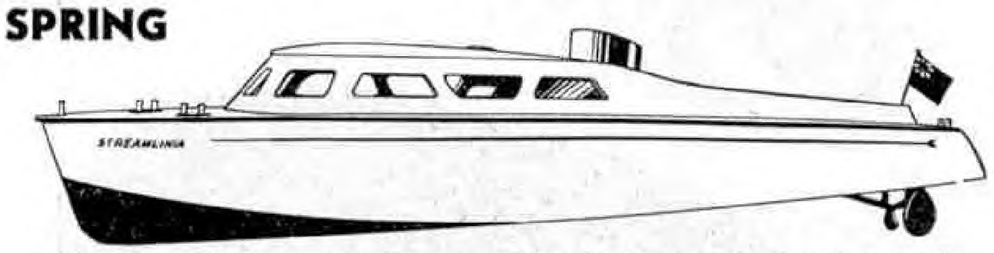
NORTHAMPTON'S SHIPYARD CALLING!

NEW MODELS FOR THE SPRING



An improvement, even on our famous "IOLANTHE I." Built on the latest lines, with detachable mahogany cabin, all deck fittings, and high class power units —either electric or clockwork. A SUPER MOTOR BOAT and just the thing for you this spring. Price, either method of propulsion, **2 gns.**

ALL MATTERS MARINE dealt with in our 100-page Model Ship Catalogue S.17. 6d. post free. Send for the latest edition to-day!



Build or buy this racing motor boat, capable of 7 knots at least, with a run of half-an-hour!

Metre size with shallow draft, chine hull, slipper stern and shell back deck. Steam propulsion from brazed copper boiler, double-action "Meteor" engine, Harrison automatic feed spirit lamp, Remod propeller. Beam 8 inches.

Finished model, **9 gns.** Set of parts and working drawings, **8 gns.**

Write for special arrangements for easy payments.

Have you seen THE LITTLE TRAIN WITH THE BIG PULL?

If not, write at once for the latest leaflet, New T.T.17, of the Bassett-Lowke Twin Train Railway. The Twin Trains are now available in three railway group colourings, L.M.S., L.N.E.R. and S.R., and a special new Permanent Way Formations Booklet has been brought out specially to help owners who want to relay or alter their layouts.

Why not add a few accessories to your outfit, Buffer Stops, Telegraph Posts, Station Lamps, Overbridges – all described in New T.T.17, free to any of you who are interested in this wonderful development in "00" gauge railways.

N.B. Have you seen our Stand and Bargain Table at the Model Railway Club Exhibition, Central Hall, Westminster, March 30th to April 3rd?



With the bright sunny days come the joys of open air, model boating on the lake in the park, yacht racing, model speedboating.

The WHITE HEATHER series of Racing Yachts, swifter for bulk, power and sail area than any yacht of their size and price. From R.2. 22 ins. long, **45/-.**

SPECIAL LOCOMOTIVES TO ORDER

We have a special department at Northampton for the production of Steam Locomotives from "0" gauge to 9½ in. gauge, either standard types or built to customers' own requirements.

These models are built by skilled engineers of long experience. Easier manipulation, maximum hauling capacity, guaranteed moderate prices and prompt service, spirit, oil or solid fuel firing, with water or fire tube boilers, according to choice.

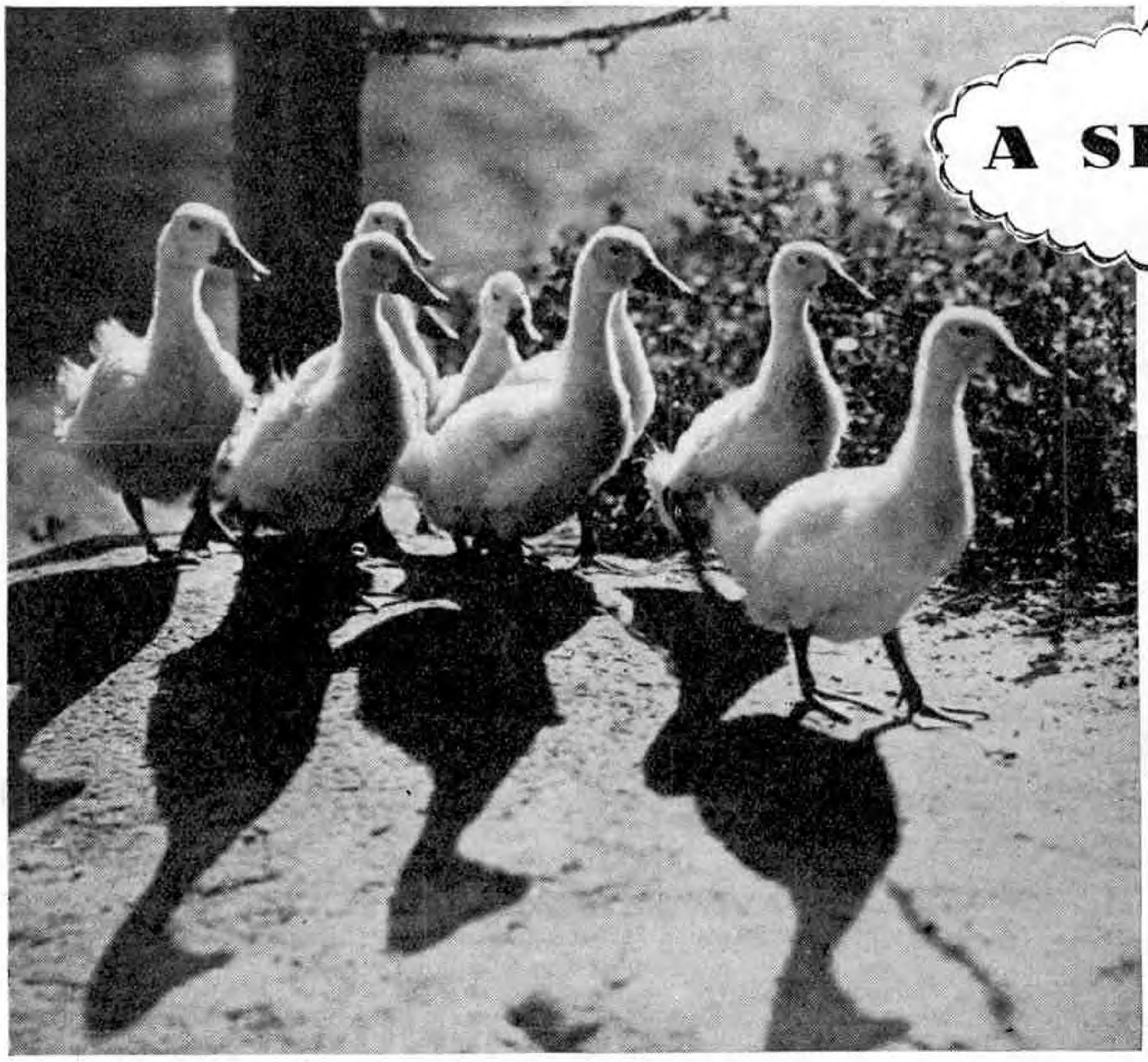
If standard scale models do not meet your traffic requirements, let us quote you for a special model to your own design and specification.

Write to Northampton for our expert's advice, and get a really fine value model for your money.

For details of every kind of Model Railway get **A.17 Model Railway Catalogue, 6d. post free**

BASSETT-LOWKE LTD., NORTHAMPTON

LONDON: 112, High Holborn, W.C.1 **MANCHESTER: 28, Corporation Street**



A SPRING OUTING

Rambling isn't complete without your camera loaded with Selochrome....First and foremost of all roll films Selochrome is the finest for pictures in the countryside. You see, Selochrome is orthochromatic, which means that every delicate shade of spring foliage, green fields, yellow buttercups and fleecy clouded skies, come out at their true tonal values.

SELOchrome
Extra Fast
ROLL FILM

Sold in sizes to fit all cameras

Made in England by ILFORD LIMITED, ILFORD, LONDON

The NEW 1937 PORTABLE SIMPLEX TYPEWRITER



The improved TOY TYPEWRITER with sliding carriage

Prints 36 Characters on paper or card 6" wide, any length. Alphabet and numerals.

MODEL R each 6/6

With the NEW SIMPLEX PORTABLE any boy or girl can produce beautifully typed letters with the utmost ease. MODEL 'R' in looks and performance is like an expensive commercial machine. It is undoubtedly the best typewriter of its kind ever made. Types perfect letters, cards, programmes, etc.

Specimens of Characters

A B C D E F G . , 1 2 3 4 5 6 7

Model 100, **5/-** each. Model S, **12/6** each. 42 characters. Model T, **21/-** each. 68 Large and Small characters.

GUARANTEED FOR 2 YEARS

FROM ALL TOY DEALERS. SEND FOR LIST.

SIMPLEX TYPEWRITER CO., 1, Newman St., London, W.1

FREE GIFT OF A SHIPSERIES

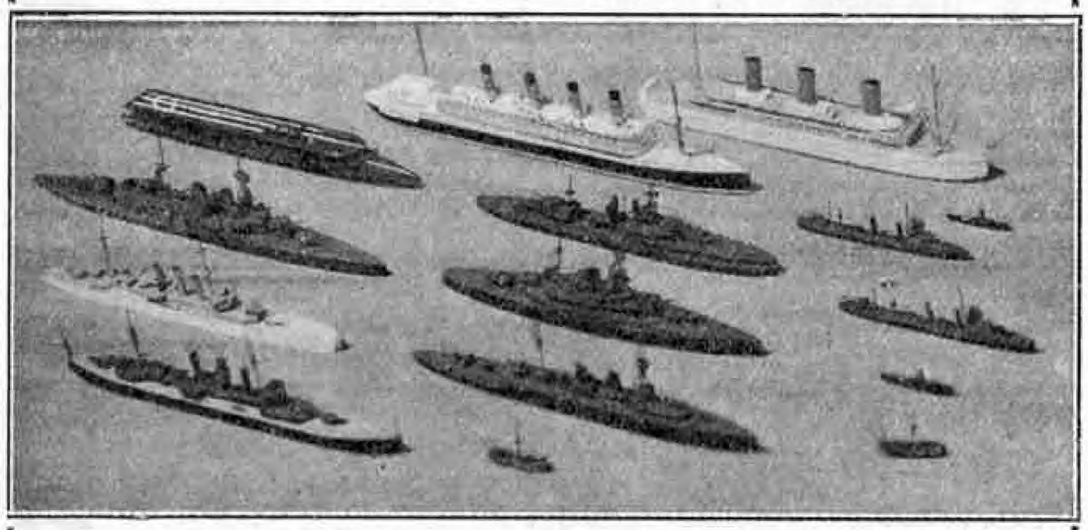
Constructional Model R.M.S. "EMPRESS OF BRITAIN"

Scale 100 feet = 1 inch.

Construct one of our Shipseries models. Send us a photograph of the model or the Box lid, enclose stamps 6d. for postage of the free gift and mention this Magazine.

Here is an opportunity to enjoy this fascinating hobby.

This offer holds good until end of August.



Why not a Coronation Naval Review at home?

Shipseries models portray all types of our Royal Navy and Merchant Shipping. Our scale model Docks, Sheds, Wharves and Cranes lend great realism to these models.

METAL CAST MODELS: Submarines, Flotilla of Six, price 1/–. Cross Channel Steamer **6d.** Oil Tanker and Cargo Steamer **9d.** each.

For list and address of nearest agent write:

A. J. HOLLADAY & CO. LTD. (Desk B), 3, Aldermanbury Avenue, London, E.C.2.

TREASURE TROVE



What is this delightful find?
Toffee of the nicest kind.
Pirates fight and rob and stab
And pirates dote on Creemy Slab.
They ask for, look for, vote for "Palm"
And so they never come to harm.

★★★ *Have you tried the NEW "Palm" Imperial Selection 3 ozs. 2d.?*

"Walters' Palm" REGD. Toffee

The Best that mummy can buy!

Walters' "Palm" Toffee Ltd., Acton, London, W.3

Can you make Invisible Ink?

EXPERIMENT 38. Dissolve a few small crystals of Copper Sulphate in a little water, and use this solution as an ink to write on paper. When the message you have written becomes dry it will not be visible (unless you have made your solution too strong). You can now "develop" this "invisible ink" in two ways.

1. Warm the paper carefully in front of a fire, and the message will show up in dark letters.

2. Expose it to ammonia vapour, produced in Experiment 28, and the letters will become deep blue.



★Try out the above, it is only one of the many interesting and instructive experiments which can be carried out with Lott's Chemistry Sets.

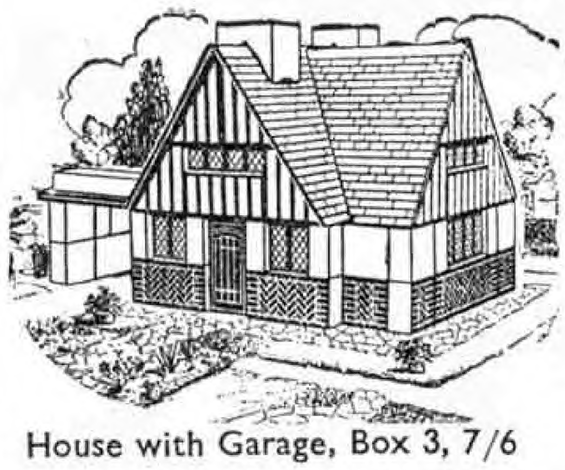
LOTT'S CHEMISTRY BOX No. 1 ... ... 3/6

★PRICES

Box	0.	24 Experiments	2/–
,,	1.	42 ,,	3/6
,,	2.	80 ,,	6/–
,,	3.	131 ,,	10/6
,,	4.	181 ,,	15/6
,,	5.	228 ,,	21/–

Also at 31/6, 42/–, 73/6 and 105/–.

Have you seen the New Tudor Blocks?



House with Garage, Box 3, 7/6

★All Boxes Now Contain bricks coloured to represent windows, doors and herring-bone bond brickwork, with which many beautiful buildings in the old English half-timbered style can be made.

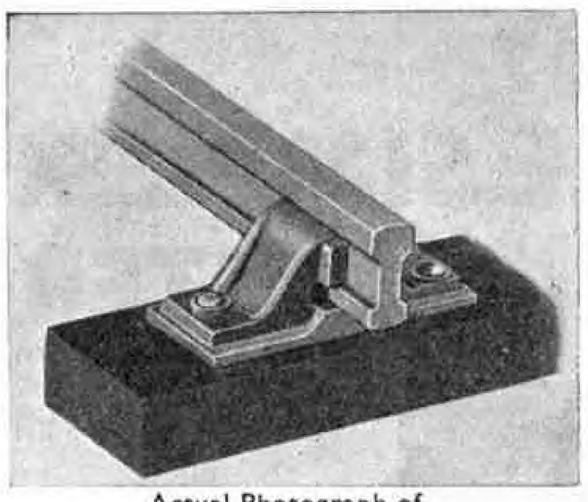
★PRICES

Box	1.	18 Models ...	2/6
,,	2.	36 ,, ...	5/–
,,	3.	54 ,, ...	7/6
,,	4.	72 ,, ...	10/–
,,	5.	90 ,, ...	15/–
,,	6.	96 ,, ...	21/–

Ask your dealer for full particulars or write to the Manufacturers for illustrated lists of all products including Chemistry Spares and extracts from the Experiment Books.

Dept. M.M.

LOTT'S BRICKS LTD., WATFORD HERTS.



Actual Photograph of Bond's British Permanent Way.

THE CHEAPEST SUPER DETAIL PERMANENT WAY . . . .

IN ALL GAUGES FROM "OO" TO ¾" SCALE.

We illustrate above an ACTUAL PHOTOGRAPH of Bond's Super Detail Permanent Way; this is not an Artist's Impression, but a Photograph of the Model Rail and Chairs which Bond's supply. The Rail Sections faithfully reproduce the outline of the Full Size Rails, also the Model Chair—that of the Latest Standard Chair as standardised by the British Railway Companies.

If you want Super Detail for your Model Permanent Way, you can only get this with Bond's Super Detail Permanent Way Parts.

PRICES

STANDARD GAUGE "O" PARTS

Steel Rail, sheradised	per yd. **2d., 1/6** doz. yds.
Brass Rail	per yd. **4d., 3/9** doz. yds.
Cast Chairs, slide-on fit	per 100 **1/2.**
Cast Chairs, for wooden keys	per 100 **1/2.**
Keys	per 100 **6d.**
Fishplates	per doz. **3d.**
Sleepers, stained correct colour	per 100 **2/–.**
Battens, ½" x ¼" section	per yd. **2d., 1/9** doz. yds.
Pins, approx. 1,000	**6d.** packet.
Track Gauge, special, with elec. chair jig ...	**9d.** each.

All Prices Plus Postage. For Prices of Gauge "OO," "1," ½" Scale and ¾" Scale, see **General Catalogue,** Price 6d. It contains 200 pages, which illustrate all the requirements of the Model-maker, including a complete list of Tools and Materials.

BOND'S O' EUSTON RD. LTD.

254, EUSTON ROAD, LONDON, N.W.1

Telephone: Euston 3780. **Established 1887**



12 pictures for the price of 8—and you see them crystal-clear and practically FULL SIZE while you take them! Those are the two features that have made the Voigtlander Brilliant famous. Using standard 8 exposure 3¼ x 2¼ film it gives you TWELVE pictures 2¼" square. Think what that will save you! And you're certain of good results because the full size view finder makes composing and taking simple. Made by the world-famous firm of Voigtlander—optical craftsmen since 1756, the Brilliant offers truly remarkable value at its price. Ask your dealer to demonstrate it, or write below for full details.

45/-

With genuine Voigtlander VOIGTAR F/7.7 Anastigmat lens, speeded shutter, 3 point focussing. Other models from £3-15 to £6-15.

You don't know how good an inexpensive camera can be till you've seen this

Voigtländer BRILLIANT

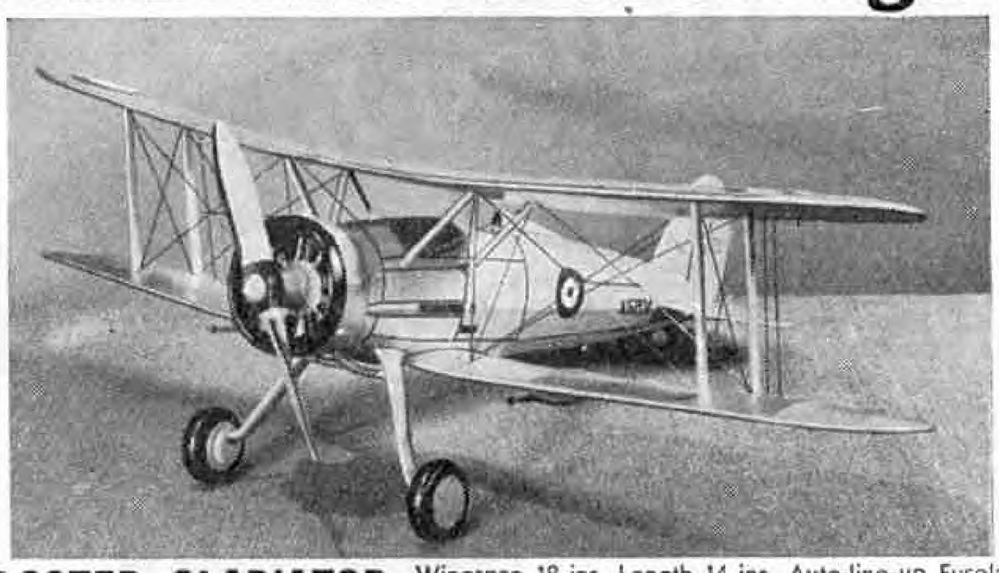
and there's the same fine value with ILLUSTRA FILM

Schering Ltd. (*Voigtlander Dept. 9*), **185/192, High Holborn, London, W.C.1**

★ VOIGTLANDER FOR VALUE ★

★ VOIGTLANDER FOR VALUE ★

COMET KITS for Good Flights



GLOSTER GLADIATOR Wingspan 18 ins. Length 14 ins. Auto-line-up Fuselage. Shock Absorbing Undercarriage. Very large clear plan, with all scale details, showing undercarriage works. The kit is complete:—balsa, shaped flying prop, cement, silver dope, clear shrinking dope. Complete kit carriage paid **5/-**

HAWKER HURRICANE

Wingspan 20 ins. Length 15 ins. Movable controls. Beautiful model with superb flying performance. Special condensed instructions four pages. Shrinking dope for silver tissue. Previous experience required. Complete kit carriage paid **4/6**



PUSS MOTH

Wingspan 16 ins. The perfect beginner's kit—simple to build, attractive appearance and fine flyer. Kit has everything needed, post free **2/-**



● *Send two 1d. stamps for new illustrated catalogue.*

SEND YOUR P.O. NOW to: **M. E. SWEETEN LTD.**
Bank Hey St., BLACKPOOL



Boys! For accurate target shooting and vermin killing the

B.S.A Air Rifle

is unsurpassed

Get a B.S.A. Air Rifle and enjoy the good sport that shooting gives.

The B.S.A. Air Rifle must not be confused with cheap air guns which are little more than toys. It is a **REAL** air rifle with remarkable accuracy and power and is unsurpassed for shooting at target or vermin. B.S.A. Air Rifles are ideal for indoor shooting, too. If used with the B.S.A. Target Holder there need be no fear of damaged walls. The only ammunition required is B.S.A. Pellets which cost only 2/3 per 1,000. Be sure to fill in the coupon for full details.

No firearms certificate is necessary to buy a B.S.A. Air Rifle but the purchaser must be over 17 years of age.

Prices from **45/-** or **4/3** a month

To B.S.A. GUNS LTD., 92, Armoury Road, Birmingham, 11.
Please send me full details of B.S.A. Air Rifles.

Name.....

Address

Join the Raleigh Boys



THEY CAN FREE-WHEEL FURTHER!!



Tom, Dick and Sam, who live not so far away, have all got Raleigh Bicycles. And they do make rings around the other boys! Why, only the other day everyone was playing at who could free-wheel furthest and the Raleigh boys won by yards. The Raleigh is the easiest, smoothest running bicycle made. That's why you'll be so proud of your Raleigh—and why other boys will be so envious. You can get a Raleigh for 5/- down and 2/- a week. Tell your father about it. He'd be glad to pay this small amount for the bicycle that's guaranteed for ever.

Models from £4-7-6 cash
(Sturmey-Archer 3-speed gear 20/- extra, cash)
Deferred Terms **5/-** down and 12 equal monthly payments (from 8/4). Sturmey-Archer 3-speed gear 2/- extra, monthly. Dunlop tyres and the best of everything. Send for free copy of "The Jubilee Book of the Raleigh," and name and address of nearest dealer.

RALEIGH
THE ALL-STEEL BICYCLE

The Raleigh Cycle Co. Ltd., Nottingham. (Depots and Agents Everywhere)

Fit the Sturmey-Archer 3-speed gear—the gear that "makes cycling easy"



A fascinating building hobby

FOR BOYS AND GIRLS

Dinky Builder Outfits are great favourites with boys and girls. The parts contained in them provide a most fascinating constructional hobby, specially designed for the younger children. These brightly coloured parts are fitted together in a most simple and ingenious manner without the use of any nuts and bolts.

There are three Outfits in the series: No. O Outfit is available in bright red and green finish, while No. 1 and No. 2 Outfits can be obtained in bright red and green or in salmon pink and jade green finish.

No. O DINKY BUILDER OUTFIT

This is an excellent Outfit with which a splendid range of models can be built. The Instruction Folder included gives examples of 40 delightful models. Price 2/6

No. 1 DINKY BUILDER OUTFIT

This fine Outfit contains a varied selection of parts, including a set of four road wheels for constructing miniature wheel toys, many examples of which are illustrated in the Instruction Folder. These instructions show a total of 70 fine models that any boy or girl can build. Price 4/11

No. 2 DINKY BUILDER OUTFIT

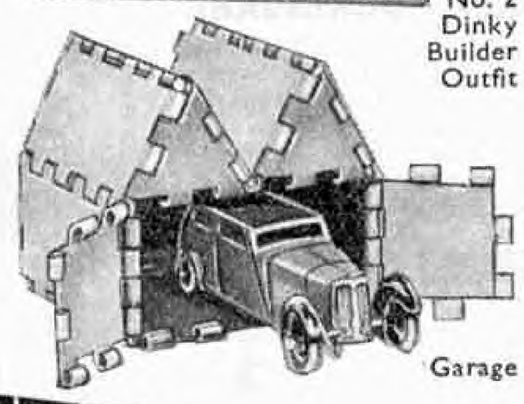
The No. 2 Dinky Builder Outfit is the largest Outfit in the series. It contains a comprehensive selection of parts with which all the No. O and No. 1 Outfits models can be built. In addition, the parts in this fine Outfit make possible the construction of seven groups of miniature model furniture. Full instructions are given in the Instruction Folders included in the Outfit. Price 7/9

DINKY BUILDER "A"

The Dinky Builder "A" packet contains a useful assortment of Dinky Builder Parts with which Outfits No. O, No. 1 and No. 2 may be supplemented. Price 1/-



No. 2 Dinky Builder Outfit



Garage

No. 3 DINKY BUILDER OUTFIT

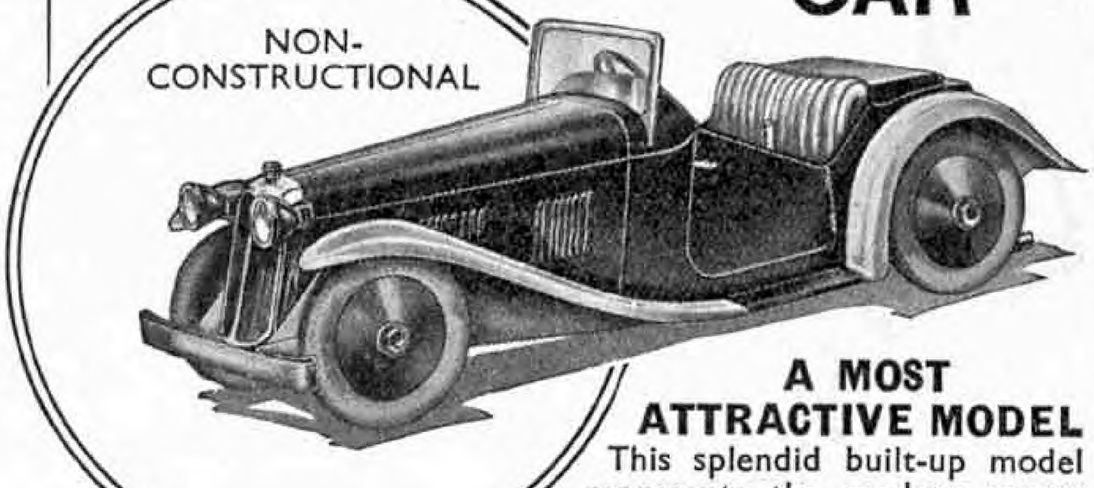
This is the largest Outfit in the series, and its model-building possibilities are almost limitless. It is the ideal gift for young boys and girls.

The parts contained in this Outfit can be used over and over again to make hundreds of different models, including Towers, Bridges, Buildings of all types, Furniture, Aeroplanes, etc. Complete instructions are provided. Price 10/9

DINKY BUILDER

Manufactured by Meccano Limited, Binns Road, Liverpool 13

A REALISTIC TWO-SEATER SPORTS CAR



The model is beautifully made and finished, and is richly enamelled in Blue and Cream

A MOST ATTRACTIVE MODEL

This splendid built-up model represents the modern sports two-seater, a type of car that combines speed and excellent road-holding qualities, and has become increasingly popular during recent years. Speed is suggested by the sweeping lines of the bodywork and mudguards, together with the sloping radiator and wind-screen.

The model faithfully resembles its prototype in all important respects. It is complete in itself, no constructional or assembly work being required. It steers from the wheel, and is fitted with a strong clockwork motor that gives a long and steady run.

Overall dimensions: Length, 8¼ in.; Width, 3¾ in.; Depth, 2⅞ in.

Price **6'6**

Manufactured by

Meccano Ltd., Binns Rd., Liverpool 13



Here is a new and interesting booklet produced in answer to the popular demand of Hornby Railway enthusiasts. It contains a wide selection of attractive rail formations, varying from quite simple layouts to more ambitious designs with double track. The best possible uses of Hornby Rails, Points and Crossings are clearly demonstrated.

The booklet is obtainable (Price 3d.) from any Meccano dealer, or (Price 4d.) post free, direct from

MECCANO LIMITED
Binns Road, Liverpool 13



NEW MECCANO PARTS FOR OLD!

Good News for Meccano Boys

Every Meccano boy should know of the wonderful Meccano Part Exchange Scheme, in order to take the fullest advantage of it.

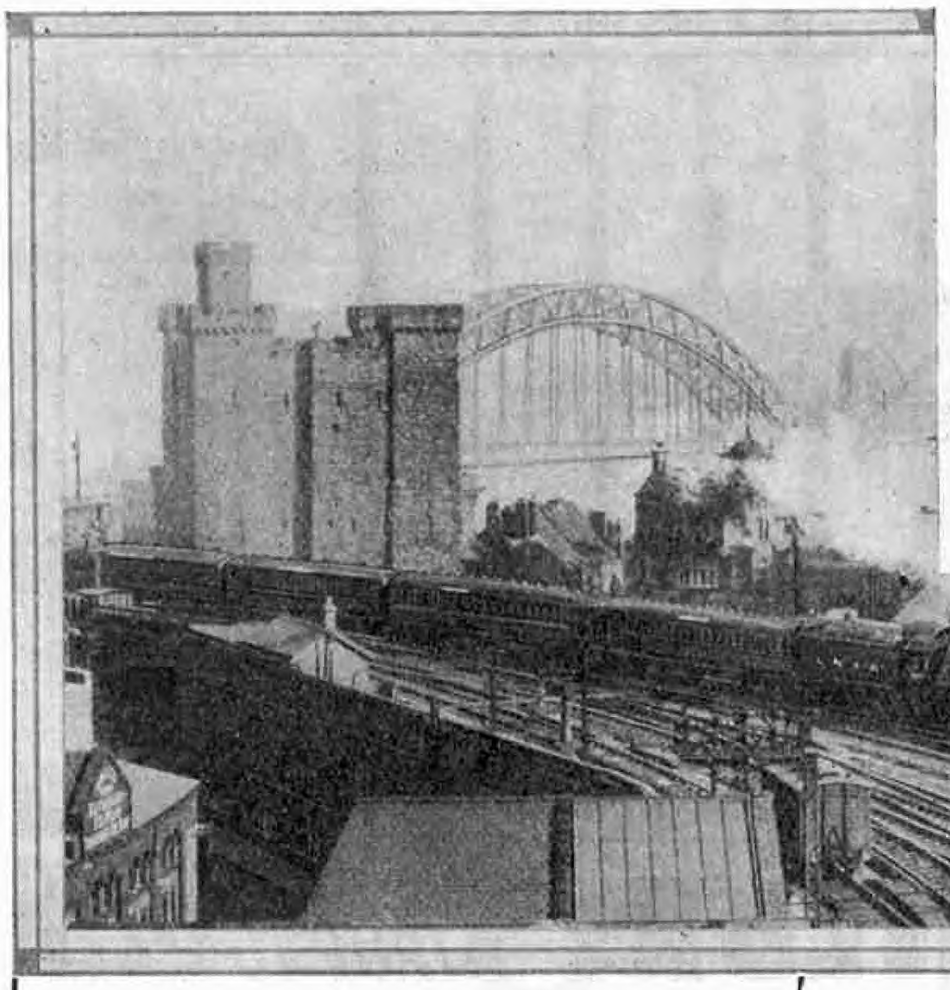
We undertake to exchange any damaged Meccano parts for similar new parts at half the current list price, no matter how old or how much damaged the parts are. Just send them to us, addressed to the Service Department, Meccano Limited, Binns Road, Liverpool 13, together with a remittance covering half the cost of the new parts. The remittance should include postage on the new parts and will be exactly the same as that you pay on the parcel of old parts you send us.

It is very important that you enclose your own name and address written in plain characters.

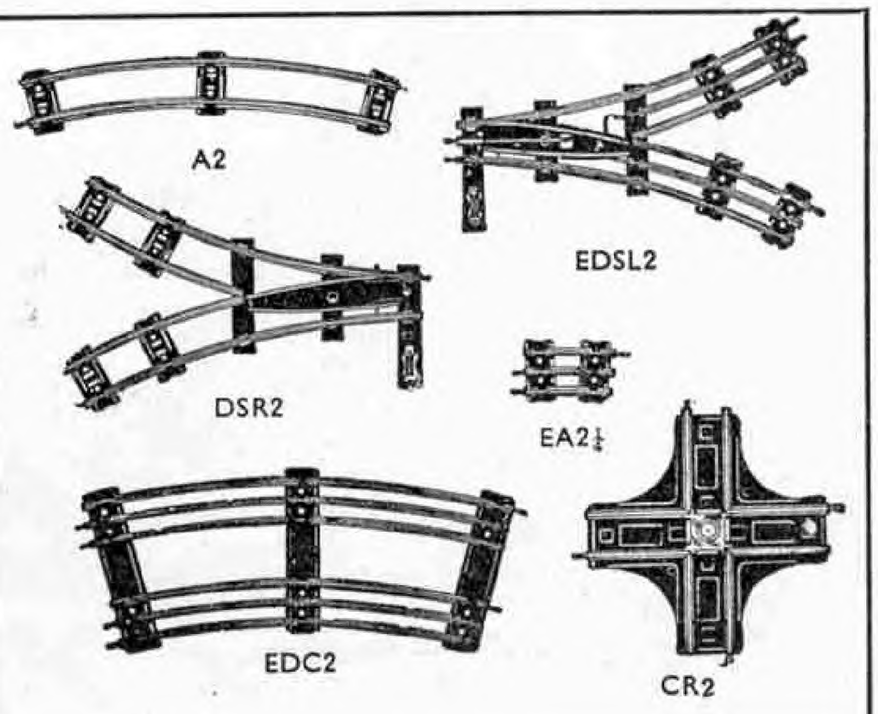
If you prefer to do so, you can effect the exchange through your dealer.

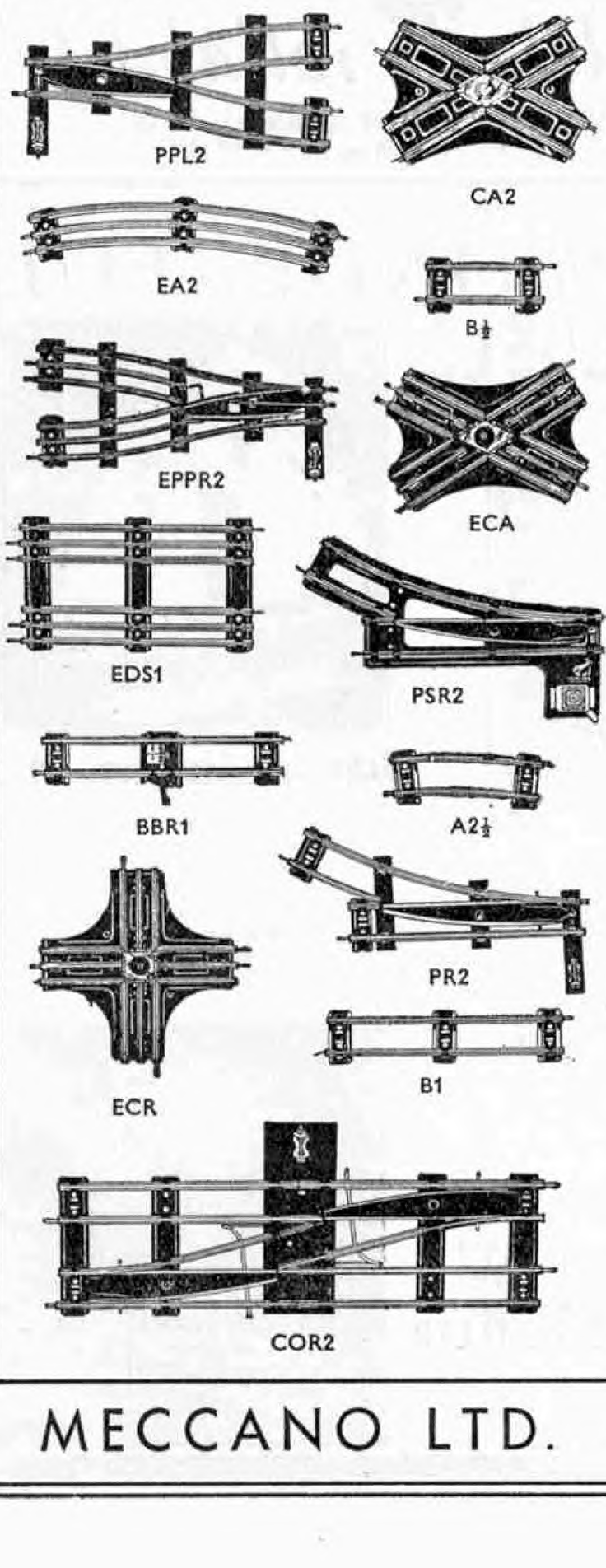
Hornby Rails, Points and Crossings

There is practically no limit to the number of rail formations that can be built with Hornby Rails, Points and Crossings. A supply of Rails is included in every Hornby Train Set, but the owner is certainly not getting the best out of his set if he is satisfied with merely running it round a simple oval track. The addition of extra Rails and of Points and Crossings to his equipment lends a delightful realism to the game and greatly enhances the fun.



The illustration on the left shows "The Flying Scotsman" crossing the complicated network of points outside Newcastle Station. In the background is the famous Arch Bridge.





Rails for Electric Trains, Gauge O, 1¼"

CURVED RAILS

1-ft. Radius

EA1	Curved rails	... ...	... per doz. 5/–
EA1½	Curved half rails	... ...	... „ 4/6
EA1¼	Curved quarter rails	... ...	„ 4/–

2-ft. Radius

EA2	Curved rails	... ...	... per doz. 5/–
EA2½	Curved half rails	... ...	... „ 4/6
EA2¼	Curved quarter rails	... ...	„ 4/–
EDC2	Curved rails, double track	...	½ doz. 9/–

STRAIGHT RAILS

EB1	Straight rails	... ...	... per doz. 5/–
EB½	Straight half rails	... ...	... „ 4/6
EB¼	Straight quarter rails	... ...	„ 4/–
EDS1	Straight rails, double track	...	½ doz. 8/6

POINTS

For 1-ft. Radius Curves

EPR1	Right-hand points }	... ...	per pair 5/9
EPL1	Left-hand points }		

For 2-ft. Radius Curves

ESPSR2	Right-hand points }	... ...	per pair 7/6
ESPSL2	Left-hand points }		

CROSSINGS

ECA	Acute-angle crossings	... ...	each 2/9
ECR	Right-angle crossings	... ...	„ 2/9

DOUBLE SYMMETRICAL POINTS

For 1-ft. Radius Curves

EDSR1	Double symmetrical points, right-hand,	
EDSL1	Double symmetrical points, left-hand,	per pair 6/–

For 2-ft. Radius Curves

EDSR2	Double symmetrical points, right-hand,	
EDSL2	Double symmetrical points, left-hand,	per pair 7/–

PARALLEL POINTS

EPPR2	Parallel points, right-hand }	per pair 7/–
EPPL2	Parallel points, left-hand }	

CROSSOVER POINTS

ECOR2	Crossover points, right-hand }	per pair 24/–
ECOL2	Crossover points, left-hand }	

EMC20	Switch rail (20-volt)	... ...	each 1/3
EMC6	Switch rail (6-volt)	... ...	„ 1/3
TCP20	Terminal connecting plates (20-volt)		„ 1/3
TCP6	Terminal connecting plates (6-volt)		„ 1/3

Rails for Clockwork and Steam Trains, Gauge O, 1¼"

CURVED RAILS

M9	Curved rails (9-in. Radius)	...	per doz. 2/6
MB9	Curved brake rails	... ...	each 3d.
A1	Curved rails (1-ft. Radius)	...	per doz. 3/6
A1½	Curved half rails	...	„ 3/–
A1¼	Curved quarter rails	...	„ 2/6
AB1	Curved brake rails	...	each 4d.
A2	Curved rails (2-ft. Radius)	...	per doz. 3/6
A2½	Curved half rails	...	„ 3/–
A2¼	Curved quarter rails	...	„ 2/6
AB2	Curved brake rails	...	each 5d.
DC2	Curved rails, double track	...	½ doz. 6/–

STRAIGHT RAILS

BM	Straight rails (for MO Trains)	...	per doz. 2/6
B1	Straight rails	... ...	„ 3/6
B½	Straight half rails	... ...	„ 3/–
B¼	Straight quarter rails	... ...	„ 2/6
BB1	Straight brake rails	... ...	each 4d.
BBR1	Straight brake and reverse rails	...	„ 1/6
DS1	Straight rails, double track	...	½ doz. 5/3

CROSSINGS

CA1	Acute-angle crossings (for 1-ft. radius track)	... ...	each 1/9
CA2	Acute-angle crossings (for 2-ft. radius track)	... ...	„ 1/6
CR1	Right-angle crossings (for 1-ft. radius track)	... ...	„ 1/9
CR2	Right-angle crossings (for 2-ft. radius track)	... ...	„ 1/6

POINTS 9-in. Radius (for MO Trains)

MR9	Right-hand points	... ...	} per pair 3/–
ML9	Left-hand points	... ...	}

For 1-ft. Radius Curves

PR1	Right-hand points	... ...	} per pair 3/–
PL1	Left-hand points	... ...	}

For 2-ft. Radius Curves

PR2	Right-hand points	... ...	} per pair 3/–
PL2	Left-hand points	... ...	}
PSR2	Points on solid base, right-hand		} per pair 8/6
PSL2	Points on solid base, left-hand		}
SPSR2	Points on solid base, right-hand		} per pair 5/–
SPSL2	Points on solid base, left-hand		}

These points are similar to Points PSR2 and PSL2 but they are not fitted with ground disc or for Hornby Control.

PARALLEL POINTS

PPR2	Parallel points, right-hand		} per pair 3/6
PPL2	Parallel points, left-hand	...	}

DOUBLE SYMMETRICAL POINTS

For 1-ft. Radius Curves

DSR1	Double sym. points, right-hand		} per pair 3/6
DSL1	Double sym. points, left-hand		}

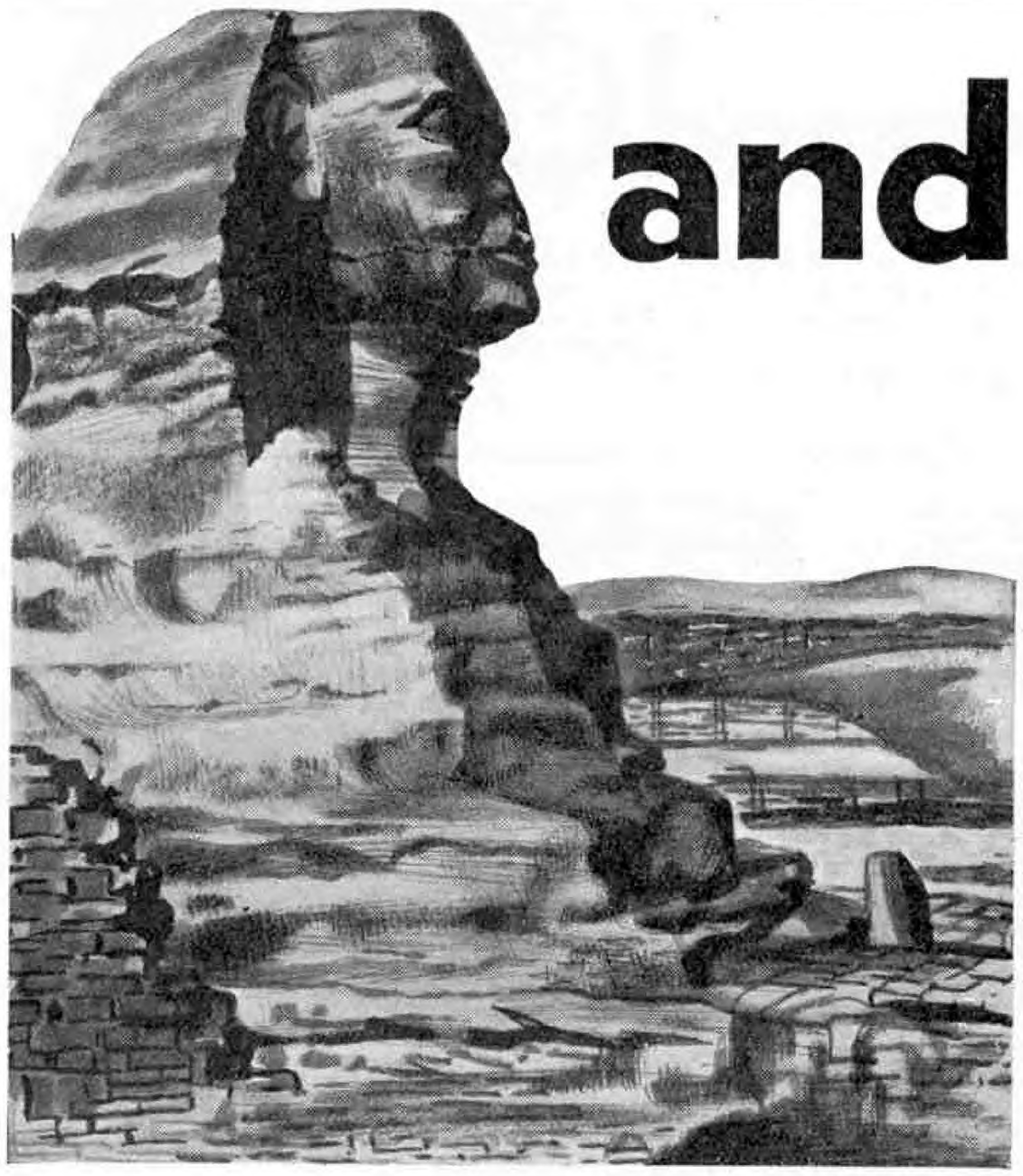
For 2-ft. Radius Curves

DSR2	Double sym. points, right-hand		} per pair 3/6
DSL2	Double sym. points, left-hand		}

CROSSOVER POINTS

COR2	Crossover points, right-hand		} per pair 12/–
COL2	Crossover points, left-hand		}
RCP	Rail connecting plates	... ...	½ doz. 2d.

Many interesting illustrations and much useful information regarding Hornby Railway layouts are given in the booklets "How to plan your Hornby Railway," and "Hornby Layouts—100 Suggestions." Each of these booklets is obtainable from your dealer, price 3d., or from Meccano Ltd., Binns Road, Liverpool 13, price 4d. post free.



and

there's only one SECCOTINE

There's only one Sphinx and there's only one Seccotine.

Seccotine has been known for over half a century as the most powerful adhesive in the world. Your grand-dad used it, when he was a boy, and if you are wise you'll use nothing else when you are doing your model-making, carpentry and repairs. It will stick anything and stick it to last. But it must be Seccotine. Look for the name on tube and carton.

Obtainable in tubes **4½**d., **6**d. and **9**d., from all good Stationers, Ironmongers and General Stores.

SECCOTINE REGD.



The Double Strength ADHESIVE

POST THIS COUPON to Dept. M

M'Caw, Stevenson & Orr Ltd., Belfast.

I should like to have, post free, copies of your free booklets which describe the many uses for Seccotine.

Name .....

Address .....

.....

Control your Model Railway with MILBRO signal levers

No model railway is complete without Milbro lever frames and signal levers. The frames can be supplied with any number of levers, in the appropriate colours, and the steel levers separately. Ask your nearest Milbro stockist to show you these perfectly constructed parts.



PRICES

4 lever frame 6/- complete
6 ,, ,, 7/6 ,,
8 ,, ,, 9/6 ,,
12 ,, ,, 14/- ,,

Steel levers for lever frames (plated) 3d. each

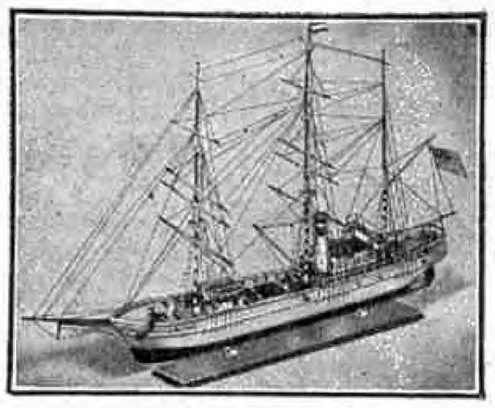
★*Write to-day for the Milbro Catalogue, price 6d.*

MILBRO *TRUE·TO·SCALE models for reliability*

MILLS BROS. (Model Engineers) LTD., Dept. F.S., St. Mary's Road, Sheffield, 2.

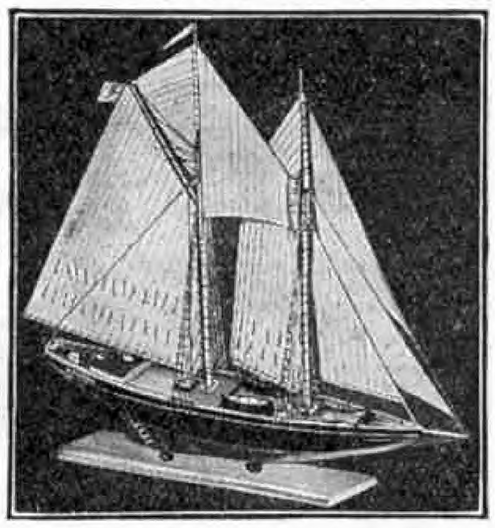
BUILD WONDERFUL SHOW MODELS

–VERY DETAILED PLANS



City of New York 4/-

Length 14 ins., height 8¾ ins. Very attractive sailing ship with auxiliary motor. Full size plan is clear and shows each sail in full. Complete kit includes balsa block for hull, spars, two metal ship's boats, anchor, cement, lacquers. Carriage paid 4/-.



Schooner Bluenose 4/-

Length 13 ins., height 11¼ ins. What a beauty! The sweetest and swiftest lines you ever saw. The full size plan is beautiful and clear with two special drawings of the deck at bow and stern. The sails and rigging are quite simple. Complete kit includes balsa block for hull, spars, two metal ship's boats, anchor, ship's barrel, quick drying cement and coloured lacquers. Easy to build. Carriage paid 4/-.

CONSTITUTION 2/-

Length 12 ins. Three masted American fighting ship with 20 deck cannons. Complete kit includes balsa block for hull, spars, quick drying cement, lacquers. Carriage paid 2/-.

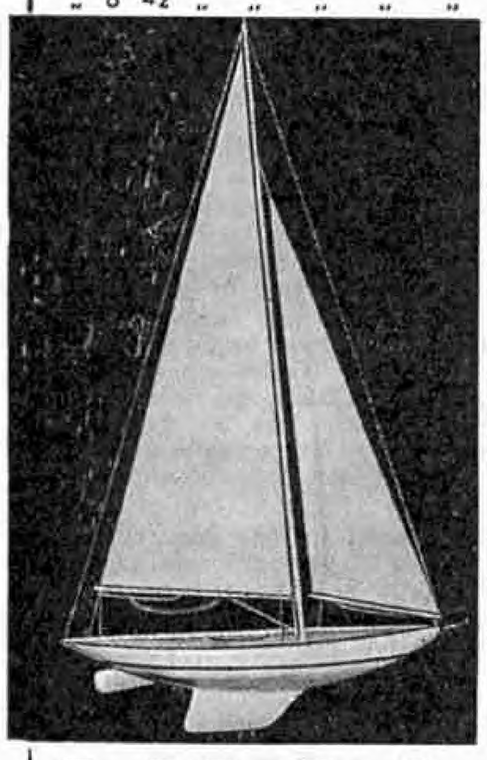


● Send 1d. stamp for NEW catalogue with MANY SHIP FITTINGS.

Send P.O. *NOW* to **M. E. SWEETEN LTD.**
BANK HEY STREET
BLACKPOOL

MODEL RACING YACHTS

No. 1	18 ins. long	(without steering gear) ...	21/-
„ 2	22 „ „	(with auto-steering gear) ...	32/6
„ 3	26 „ „	...	45/-
„ 4	30 „ „	...	84/-
„ 5	36 „ „	...	126/-
„ 6	42 „ „	...	177/6



If it's a winner you want —we have it. For after all "it's the finish that counts."

Bermuda Rig

Union Silk Sails

Hollow Metal Spars

Automatic Steering Gear

Hollow Yellow Pine Hull

Plated Fittings

LUCAS'S

THE BOYS' ARCADIA,
17, Houghton Street, Clayton Square,
LIVERPOOL 1. Tel. Royal 562.

A.S.A.S.

ELECTRIC MOTORS ONLY 1/- plus 6d. postage, with instructions. 4½ volts, 5,000 r.p.m. Drives any model. Stock limited. Send now to WAVERLEY SUPPLY CO., 148, High Holborn, London, W.C.1.

BECK'S CHEMISTRY



SETS
PRICES FROM:
2/6 to 105/-
(post free)
EQUIP YOUR OWN LABORATORY WITH APPARATUS AND CHEMICALS.

WRITE FOR LATEST CATALOGUE FREE!

BECK (Scientific Dept. G.), 60, High St., Stoke Newington, London, N.16.

THE WEBLEY SERVICE AIR RIFLE MkII

NO LICENSE REQUIRED TO PURCHASE

WRITE FOR DESCRIPTIVE BOOKLET



This extremely accurate and powerful Air Rifle is ideal for Target Practice in the garden or for exterminating Rats and similar Vermin.
Calibre 22 or 177. With leafsight and peepsight.
Webley & Scott Ltd., 87, Weaman St., Birmingham 4

CINEMATOGRAPHS Br'tish Made from 37/6
CINEMATOGRAPH FILMS

Standard Size only. Write for Catalogue, post free. Sample Film and Catalogue 1/- and 2/6.
Filmeries Co., 57, Lancaster Rd., Leytonstone, E.11

Photographers

Develop your own negatives

TRADE MARK 'TABLOID' BRAND

'RYTOL' TRADE MARK

Universal Developer

Saves you trouble

Cartons to make 100 *ounces From Photographic Dealers* 1/6

Write for "Guide to Photography"

BURROUGHS WELLCOME & CO.
SNOW HILL BUILDINGS, LONDON, E.C.1

xx 7641 COPYRIGHT

Standard Films for Sale or Hire, from 5/-.—Baers, 176, Wardour Street, W.1. Established 1907.

GRAMOPHONE attachments for Radio, electric motors, 25/-; Pick-ups, 9/6; Portable Gramophones, 12/-; Spring Motors, 4/6, dozen 36/-, 100 £12/10/-, 1,000 £100; Walnut Pedestal Anexagram, £5; Soundboxes, Tonearms, Horns, Cabinets, Needles, Gears, Springs, Accessories, cheapest. Quantity buyers obtain lower prices. Catalogue free.

REGENT FITTINGS CO., 78D, 120, OLD STREET, LONDON, E.C.1.

RIVERCRAFT FOLDING CANOES



This year—
CANOE CRUISING HOLIDAYS!

Touring in fast, lightweight folding canoes is more popular than ever. Give yourself a different holiday this year, healthier and more exciting week-ends. Visit Rivercraft and see the entire 1937 range of Folding Craft. Don't delay, the demand is increasing. Write for illustrated lists.

Prices from £5 15s. for a two-seater

RIVERCRAFT

(DEPT. MC.)
Adjoining Kingston Bridge, Middx. (Tel. Kingston 3675) and 16, Victoria Street, Manchester

---

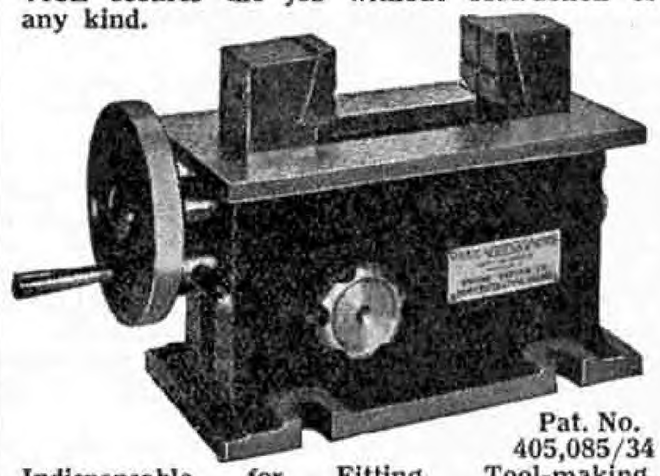
GRIPS ON ·005 inch!

THE BRITISH MADE **ALL-STEEL**

VERSA-VICE

With Vertical and Horizontal Movements.

The projection of the Gripping Jaws above the surface of the Face-Plate being instantly adjustable, objects may be gripped by as little as .005"—firmly, but without distortion. Working is thus facilitated, as the VERSA-VICE secures the job without obstruction of any kind.



Pat. No. 405,085/34

Indispensable for Fitting, Tool-making, Drilling, Milling, Shaping, Engraving, etc.

SPECIFICATIONS AND PRICES:

Model "MINI"	Model "MEDI"
Overall length 7.5/16"; *Overall Height* 2½"; *Gap between Jaws* 2⅛"; *Max. Jaw Projection* 13/16"; *Width of Jaw* ¾"; *Weight* 6 *lbs.*	*Overall length* 13"; *Overall Height* 5½"; *Gap between Jaws* 3⅝"; *Max. Jaw Projection* 2"; *Width of Jaw* 1⅜"; *Weight* 32 *lbs.*
Price **£1-19-6**	*Price* **£4-17-6**

Carriage and Packing free.

● *USED BY leading Engineers, Instrument Makers, Tool-makers, and Aircraft Manufacturers.*

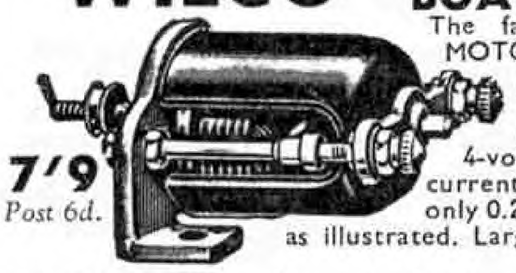
SEND FOR FULL DESCRIPTIVE FOLDER TO:

WILLIAM FROST & CO., Engineers
(Dept. M.E.), 2, St. Nicholas Buildings, Newcastle.
London Office: 43/46, Southampton Buildings, Chancery Lane, London, W.C.2.

Metcalf Advtg.

½ h.p. Model petrol motor castings, 9/9 per set. Catalogue 3d. Butler, Littleover, Derby.

"WILCO" ELECTRIC BOAT MOTOR



7'9 *Post 6d.*

The famous "Wilco" MOTODYNE is excellent for speed boats, models, etc. Works off 4-volt battery. Low current consumption of only 0.25 AMPERES. 7/9 as illustrated. Larger model 11/6.

LOOK!! Our New enclosed Motor, now ready; 2-6 Volts fitted with pulley and toothed gear wheel. Just what you have been waiting for. **5'6** *Post 4d.*



Complete Electrical Catalogue 4d. Post Free.

L. WILKINSON, 204, Lower Addiscombe Road, CROYDON.

BE TALL

Your Height increased in 14 days or money back! 3-5 inches rapidly gained. Amazing Complete Course sent for 5/- P.O., or details free. Write **Stebbing System, Dept. M., 28, Dean Road, London, N.W.2.**

"MECCANO MAGAZINE" BINDERS

Keep your "M.M.'s" clean and tidy with our special spring-back binder. Two sizes, price 2/6 and 3/6 post free, from Meccano Ltd., Binns Road, Liverpool 13.

AEROMODELS 1/24th Full Size (Non-Flying) Scale Model Construction Kits

LOOK AT THESE PRICE REDUCTIONS

D.H. "Dragon" ...	7/6 NOW 5/6	Hawker "Hart"	5/- NOW 4/-
Comper "Swift"	3/6 NOW 2/6	Sopwith "Camel"	4/- NOW 3/-
D.H. "Fox Moth"	4/- NOW 3/-	Bristol "Bulldog"	6/- NOW 4/6
S.E. 5a	3/6 NOW 3/-	Gloster "Gauntlet"	5/- NOW 4/-

THESE ARE AMAZING VALUE
WHY NOT BUILD ONE FOR YOURSELF?

Postage Abroad Extra



"GLOSTER GAUNTLET." Wing Span 16⅜"

FREE Please send me Illustrated Literature containing full details of all Aeromodel and Aerominor Kits.

Name .....
Address .....
.....

AEROMODELS LTD., Dpt.D, 1st Floor, Wellington Bldgs., STRAND, LIVERPOOL

Post Coupon To-day. ½d. Stamp if envelope is unsealed

READERS' SALES

Readers should note that all advertisements of Hornby Trains and other Meccano products included in this column relate to items no longer featured in the catalogue. Advertisements of current products cannot be accepted for this column.

For Sale. Bassett-Lowke King George V A.C. 20-v. Remote control, 6 months old. Good condition. First offer over £3/10/-.—Prowse, Southview, Thurlestone.

Sale. Pair of Headphones, 2/-. Transformer producing 8, 5 and 3 volts, 5/-.—Steel, Hilda House, Middlesbrough.

Henry Reed complete Tutor of Pianoforte Syncopation. Cost 21/-. Sale 12/-.—Harriss, 42, High Street, Wells.

Surplus Pathé 9.5 Films—30's, 1/9; 60's, 3/6; Supers from 8/-. Send for list.—85, Killinghall Road, Bradford.

Sale. No. 5 nickel-plated and No. 1 and extras (Red-Green) Meccano in Cabinet, £2.—Mitchell, Gadsonbury, Stansted.

"Meccano Magazines," 1924–June 1931, 17/6; "Railways of the World," parts 1-18, 5/-; "Model Railway News," volumes 1-12, bound, 50/-.—I. G. Macmillan, 6, Kaimes Road, Edinburgh, 12.

Sale or suitable exchange. 57 "Meccano Magazines," Feb. 1931–Dec. 1935, 30 covers. Also Home Laboratory. Offers?—Holt, Sand, Wedmore, Somerset.

Meccano (Red-Green) Outfit No. 4 with Accessories, good condition. Offers?—Bolton, Brooke Road, Sheringham, Norfolk.

For Sale. A number of Books and Toys at bargain prices. Send stamp for bargain list.—R. Lee, 3, Southmount Terrace, Leeds, 11.

Sale. Meccano—about £10 worth including Electric and Clockwork Motors. Excellent condition. Bargain, £4.—Keyes, Alne Vicarage, York.

Sale. Stamps, Books, Boats. List ½d.—Hugall, Station Hotel, Prospect Row, Sunderland.

Sale. Triumph Stamp Album with 750 Stamps, 30/-. Also 65/- Red-Green Meccano, 30/-.—D. Mitchell, Ferry Farm, Stone, Tenterden, Kent.

For Sale. New Aeromodels assembled and painted, "Bristol Bulldog," 10/-; "Puss Moth," 10/-; "Comper Swift," 8/-; also Simplex Typewriter (D), 7/-; Bayco Constructional Set, cost 42/-, accept 20/-.—W. Rankin, 10, Grosvenor Street, Manchester.

Sale. "M.M.'s," 1930-1935, bound, 1936 loose, two spring-back Binders, all for £1 to Guild member.—McCrimmon, 2906 N.E.45 Avenue, Portland, Oregon, U.S.A.

Sale. Silkworms' Eggs, 1/- per 200. Post free. Interesting and educational.—Westlake, 66, Tulse Hill, London, S.W.2.

Sale. "M.M.'s," 1930-1936. Good condition. 10/- or offers.—Hadlow, Colwall, Malvern.

800 Foreign Stamps mounted in Triumph Album. Cheap 15/-.—Greenhead, Cleckheaton, Yorks.

Sale. Two Standard Cinematographs with Films. Particulars ½d. stamp.—85, Wood Vale, London, S.E.23.

24 "Meccano Magazines," 1935 and 1936. 1½d. each.—Fidler, Hassock Lane, Shipley, Nr. Derby.

Sale. "Meccano Magazines," 1933 to 1936. Complete 12/-, postage extra.—Levati, 14, Oakhill Road, Surbiton.

"M.M.'s," 1933:1936 inclusive, new condition, 9/- or 2/9 a year, post free.—Anderson, 1, Kersland Street, Glasgow, W.2.

For Sale. Ideal Stamp Albums, 3 volumes, place marked for every stamp from 1840 to 1933. Cost 2 guineas, what offers?—J. Sclater Booth, Newnham House, Basingstoke.

50/- worth Red/Green Meccano. 20/- or offer. Apply—Halter, Diss, Norfolk.

Sale. Nice collection 1,000 British Colonial Stamps. Offers?—Mawson, Sandylodge, Northwood, Middx.

Sale. 56 "Red Arrows." Whole issue 5/-. Also "Dixon Hawkes," etc. List free.—Robert Paton, Mansefield, Symington, Kilmarnock.

Bowman Stationary Steam Engine. Cost 10/6. Excellent condition. What offers?—I. Jack, 10, Minto Street, Edinburgh.

400 Colonial and Foreign Stamps in X.L.C.R. Album. Value 5/6. What offers?—J. Playforth, 23, Station Road, Ossett.

For Sale. Mixed Railway and Stamps. Stamp list.—Tingley, Mowshurst, Edenbridge, Kent.

Sale. Three Cameras, Railway, Stations, Speedboats, Aeroplane Engine. Cheap. Particulars from—P. Holt, Lackham House, Chippenham, Wilts.

Sale. "M.M.'s," 1933–Oct. 1936. Five missing, also five older copies, perfect condition, 7/8. Two pairs Headphones, 2/- each.—23, Duke Street, Edinburgh.

Sale. Bowman 101 Engine. Used twice. Unscratched. 29/6 or near offer.—Richardson, Murrayfield, Rolston Road, Hornsea, Yorks.

For Sale. Six Fantail Pigeons. What offers?—Tingley, Winfrith, Mowshurst, Edenbridge, Kent.

Sale. Junior Typewriter, 11/6 post free.—Slade, 16, Sandy Lane, Stretford, Lancashire.

Wanted. Stamp Collections in exchange for reliable long-distance Racing Pigeons which also win in shows. Upwards of fifty awards secured this season. Or will sell Racers. Prices on application.—Gillham, 12, Belle Vue, Morda, Oswestry.

This Month's Special Articles

	Page
A Modern Fire Escape	212
Air News	196
Books to Read	220
Competition Corner	247
Daintiest Farm in the World	194
Diesel Engines for Road Vehicles ...	200
Dover-Dunkerque Train Ferry (2) ...	198
Engineering News	210
Fireside Fun	248
From Our Readers	224
Gold Won from a River Bed	201
Guild Pages	234–5
Holman Scrapeloder	222
Hornby Railway Company Pages ...	236–41
In Hebridean Seas (1)	206
In Search of New Models	226
Machine that Strides to Work	192
Marvels of Tin Can Making	208
Model-building Competitions	232
Model-building Competition Results ...	233
Our Wonderful World	216
Prize-winning Working Models ...	230
Railway News	204
Shipping News	214
Stamp Collecting	243
Stamp Gossip	245
Story of the Atlantic Ferry	190
Suggestions Section	228
Vickers Military Aircraft	202

Collect Shipping Photographs

Send 3d. for specimen postcard and our new illustrated List of over 900 different real photographs of Liners, Freighters, inc. Cunard White Star, Harrison, Blue Funnel, etc., 2d. each, 2/- per dozen, postage free. Photographs of the new liners: "Awatea," "City of Benares," and "Queen Mary," now available.

B. & A. FEILDEN (M.18),
12, Harlech Road, Blundellsands, Liverpool, 23, Eng.
(Trade Enquiries Invited.)

Collect 'R.P.' Photos

Send 4d. for list (stating section), specimen card and booklet. Post Card size 2/6 per doz. post free

AEROPLANE PHOTOGRAPHS
Over 800 titles of Aircraft of the World.

RAILWAY PHOTOGRAPHS
Over 1,200 titles, including pre-grouping and latest expresses.

SHIP PHOTOGRAPHS
300 titles, battleships, liners, sailing ships.

REAL PHOTOGRAPHS CO. (Dept. M.),
Cooper's Buildings, Church Street, Liverpool 1.

CIGARETTE CARDS

Send for
1937 FREE AND POST FREE CATALOGUE
OF OVER 700 POPULAR SERIES

The 1937 Edition of our
FULL STANDARD CATALOGUE IS NOW READY. **Price 1/2 Post Free.**
Particulars of nearly 3,000 Series, and much interesting information.

All Collectors should read
"THE CIGARETTE CARD NEWS"
A Monthly Journal for the Card Enthusiast
Specimen copy 2½d., 6 months' subscription 1/3, post free.

THE LONDON CIGARETTE CARD CO. LTD.,
Room E, Cambridge House, 30, Wellesley Road, Chiswick, LONDON, W.4.

MECCANO LUBRICATING OIL

Before commencing to operate a Meccano model, or to run a Hornby Train, all gears and bearings should be oiled thoroughly with Meccano Lubricating Oil. This oil is specially prepared and is of the right consistency for the purpose. Price per bottle 6d.



Meccano Ltd., Binns Road, Liverpool 13.

MECCANO MAGAZINE

Registered at G.P.O., London, for transmission by Canadian Magazine Post.

EDITORIAL AND ADVERTISING OFFICE:—
LIVERPOOL 13, ENGLAND.

Telegrams: "Meccano, Liverpool."

Publication Date. The "*M.M.*" is published on the 1st of each month and may be ordered from any Meccano dealer, or from any bookstall or newsagent, price 6d. per copy. It will be mailed direct from this office, 4/- for six issues and 8/- for twelve issues.

To Contributors. The Editor will consider articles and photographs of general interest and payment will be made for those published. Whilst every care will be taken of articles, etc., submitted, the Editor cannot accept responsibility for any loss or damage. A stamped addressed envelope of the requisite size should be sent where the contribution is to be returned if unacceptable.

Readers' Sales and Wants. Private advertisements (i.e., not trade) are charged 1d. per word, minimum 1/-. Cash with order. Editorial and Advertising matters should not be dealt with on the same sheet of paper.

Small Advertisements. 1/6 per line (average seven words to the line), or 16/- per inch (average 12 lines to the inch). Cash with order.

Display. Quotations for space bookings, and latest net sale figures, will be sent on request.

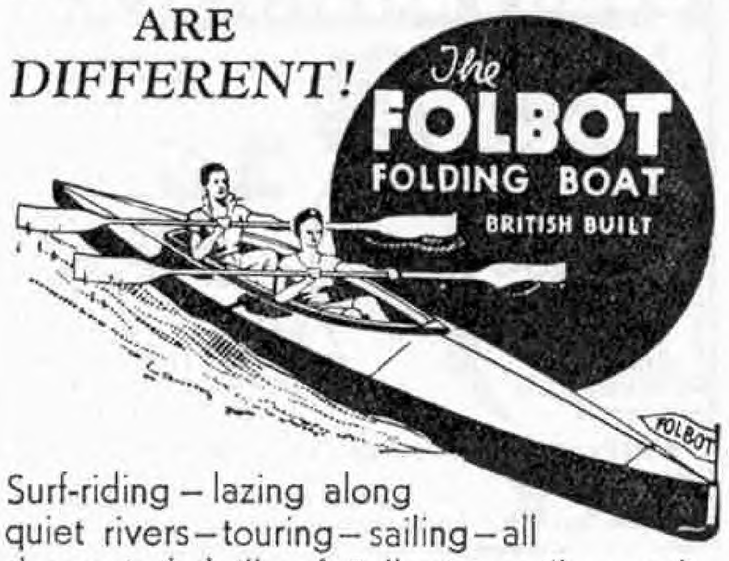
Press Day, etc. Copy should be sent as early in the month as possible for insertion in following issue. We usually close for press on or before 6th of each month for following issue. Half-tone blocks up to 100 screen.

Proofs of advertisements will be sent when possible for space bookings of not less than half-an-inch.

Voucher copies. Sent free to advertisers booking one inch or over. Other advertisers desiring vouchers should add 8d. to their remittance and should order voucher copy at same time.

Remittances. Postal Orders and Cheques should be made payable to Meccano Ltd.

FOLBOT HOLIDAYS ARE *DIFFERENT!*



Surf-riding – lazing along quiet rivers – touring – sailing – all the varied thrills of Folboting will soon be in full swing.

Have you realised how inexpensive these sea-worthy Folding Craft are to buy? Packed, a Folbot is carried like ordinary luggage. Set up in a few minutes, it forms a real-sized craft to carry up to three passengers and their luggage. No maintenance costs. Two-seaters from £5 15s.

Send for our Free Booklet "Peeps at Britain's Waterways."

FOLBOT FOLDING BOATS LIMITED
21-27, HATFIELD ST., GOLDEN LANE, LONDON, E.C.1

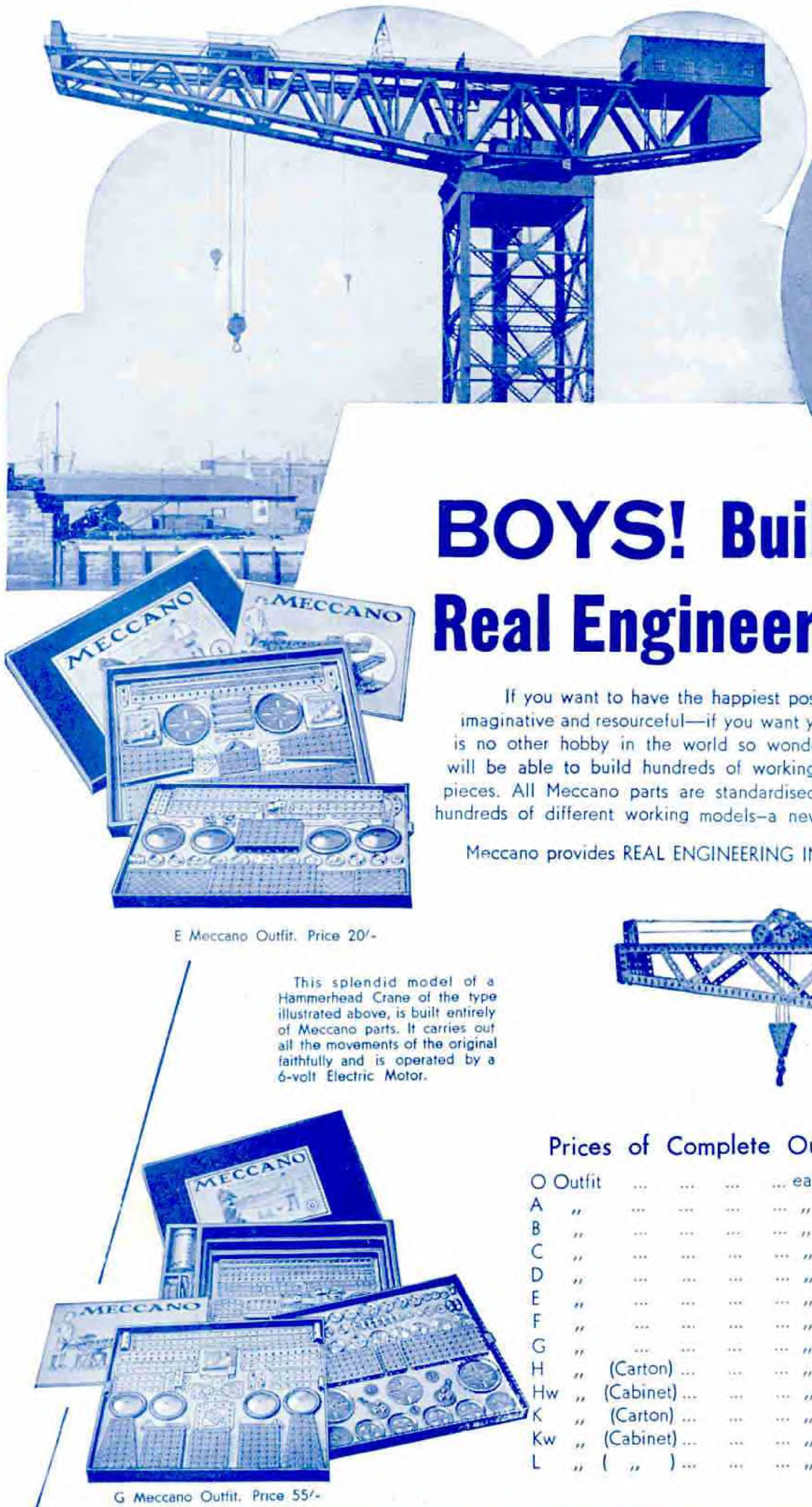
WEBLEY AIR PISTOLS

Marvellously accurate for target practice.



No license required to purchase.
Senior 45/-, Mark 1 30/-, Junior 20/-, Webley Air Rifle 84/-
Write for List. WEBLEY & SCOTT LTD., 87, WEAMAN STREET, BIRMINGHAM, ENG.

MECCANO





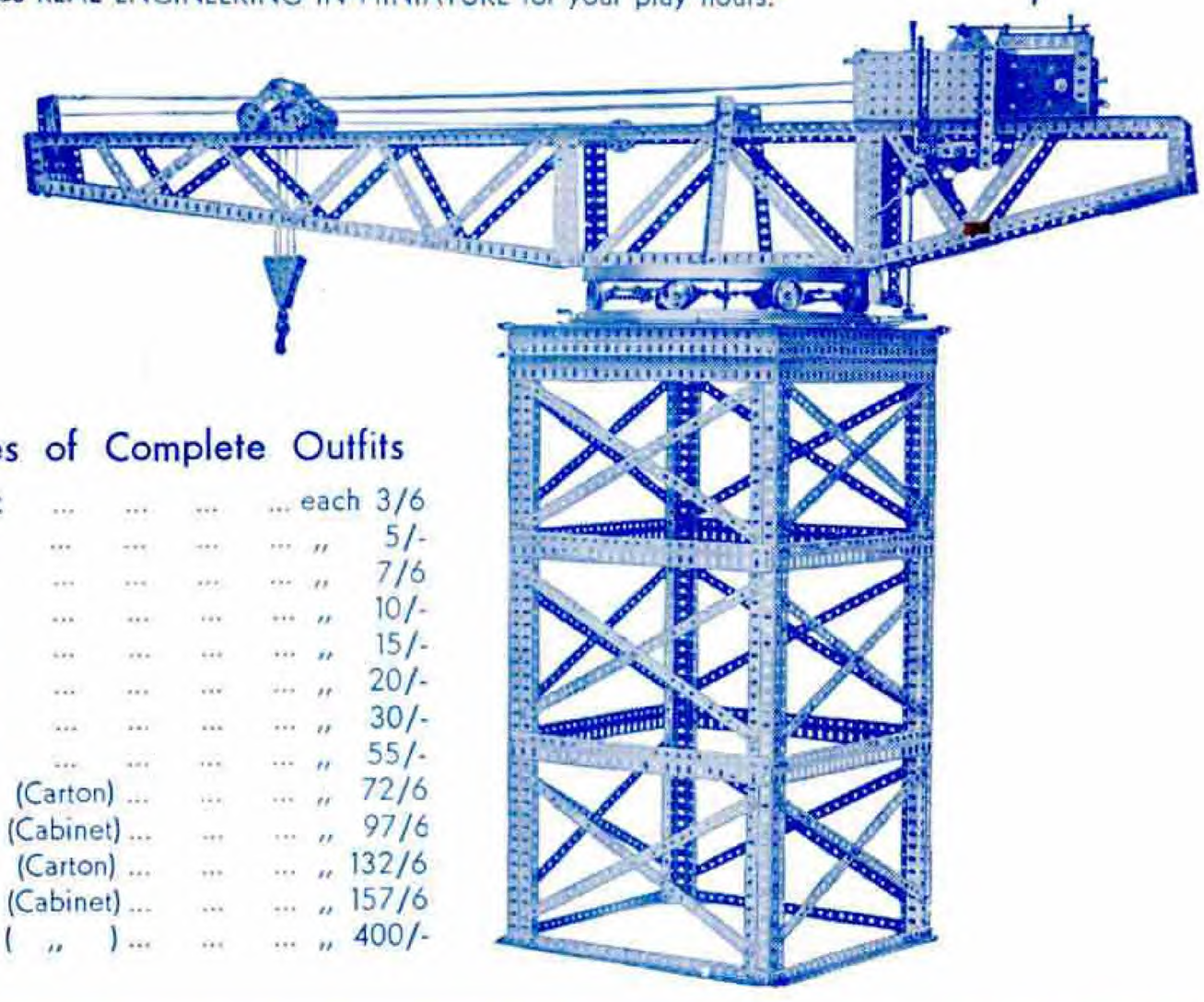
BOYS! Build Real Engineering Models like this

If you want to have the happiest possible boyhood—be a Meccano Boy. If you want to be imaginative and resourceful—if you want your days to be full of thrills—be a Meccano Boy. There is no other hobby in the world so wonderful or so fascinating. With a Meccano Outfit you will be able to build hundreds of working models of the world's greatest engineering masterpieces. All Meccano parts are standardised and interchangeable and can be used to make hundreds of different working models–a new one every day.

Meccano provides REAL ENGINEERING IN MINIATURE for your play hours.

E Meccano Outfit. Price 20/-

This splendid model of a Hammerhead Crane of the type illustrated above, is built entirely of Meccano parts. It carries out all the movements of the original faithfully and is operated by a 6-volt Electric Motor.



Prices of Complete Outfits

O	Outfit	... ...	... each 3/6
A	„	... ...	... „ 5/-
B	„	... ...	... „ 7/6
C	„	... ...	... „ 10/-
D	„	... ...	... „ 15/-
E	„	... ...	... „ 20/-
F	„	... ...	... „ 30/-
G	„	... ...	... „ 55/-
H	„	(Carton)	... „ 72/6
Hw	„	(Cabinet)	... „ 97/6
K	„	(Carton)	... „ 132/6
Kw	„	(Cabinet)	... „ 157/6
L	„	(„)	... „ 400/-

G Meccano Outfit. Price 55/-

MECCANO LTD. - BINNS ROAD - LIVERPOOL 13

AHOY THERE, BOYS!.....



These are Hornby Speed Boat Days

Model speed boat racing is one of the most thrilling hobbies you can have, brimful of excitement from start to finish. But the amount of fun you get depends on the kind of boat that flies your colours. That's why you'll be proud to own a Hornby—every inch a champion, sleek, smart and swift. A winner against all comers!

HORNBY SPEED BOATS

When other boats are slowing up, the Hornby Speed Boats are still going strong. The special design of the propeller and the unique methods employed in the construction of the hull give each model exceptional speed and length of run.

These fine boats are built with the same precision and craftsmanship as the famous Hornby Trains. You will be amazed at their outstanding performance—the No. 3 Speed Boat does a snappy run of over 500 feet on one winding!

HORNBY RACING BOATS

The series of Hornby Racing Boats is composed of three exceptionally fine models that are "quick off the mark," and which maintain a high rate of speed throughout the whole length of their run. Their remarkable performance, perfect design and beautiful appearance have already gained for them a unique popularity among boys.



HORNBY SPEED BOAT No. 1. "CORONATION." PRICE 2/11



HORNBY RACING BOAT No. 1. "RACER I." PRICE 4/6



HORNBY SPEED BOAT No. 2. "SWIFT." PRICE 7/6



HORNBY RACING BOAT No. 3. "RACER III." PRICE 14/6



HORNBY LIMOUSINE BOAT No. 4. "VENTURE." PRICE 15/6

PRICE LIST

HORNBY SPEED BOATS

HORNBY SPEED BOAT No. 1. "CORONATION"	...	Price **2/11**
HORNBY SPEED BOAT No. 2. "SWIFT"	...	Price **7/6**
HORNBY SPEED BOAT No. 3. "CONDOR." "GANNET" or "CURLEW"	...	Price **12/6**
HORNBY LIMOUSINE BOAT No. 4. "VENTURE"	...	Price **15/6**
HORNBY CABIN CRUISER No. 5. "VIKING"	...	Price **16/6**

HORNBY RACING BOATS

HORNBY RACING BOAT No. 1. "RACER I"	...	Price **4/6**
HORNBY RACING BOAT No. 2. "RACER II"	...	Price **8/6**
HORNBY RACING BOAT No. 3. "RACER III"	...	Price **14/6**

HORNBY WATER TOY

HORNBY WATER TOY (DUCK)	...	Price **2/6**

Manufactured by
MECCANO LTD., BINNS ROAD, LIVERPOOL 13

HORNBY SPEED BOATS

PUBLISHED BY MECCANO LTD., BINNS ROAD, LIVERPOOL 13, ENGLAND.
Printed by John Waddington Ltd., Leeds and London